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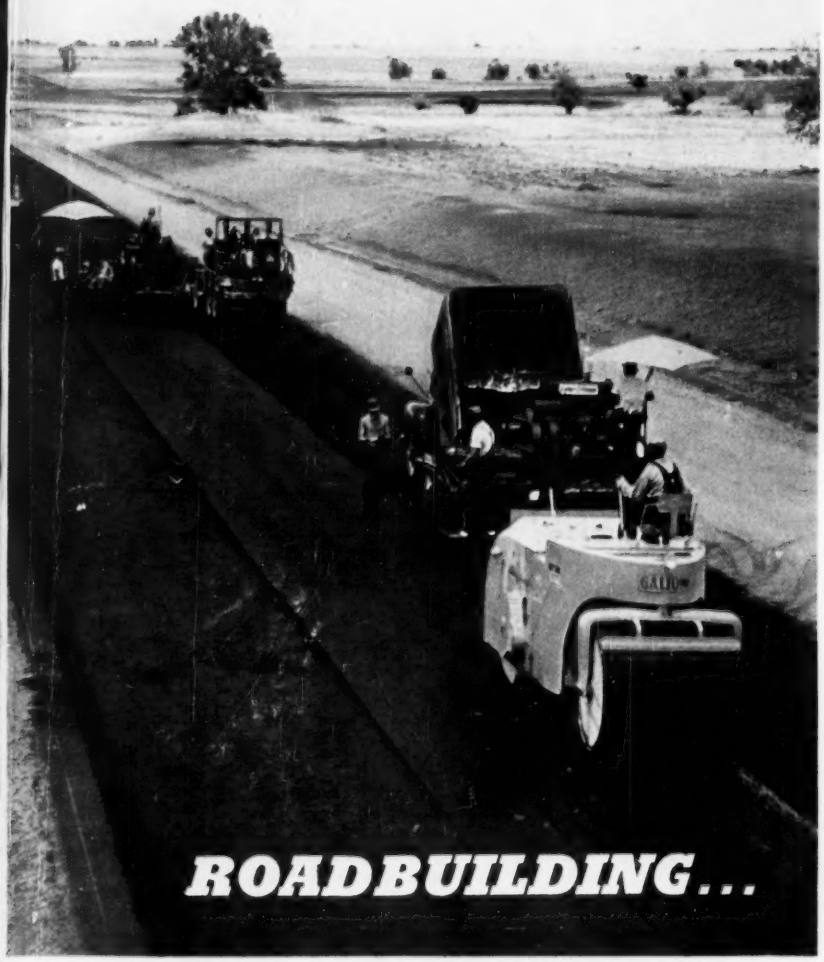
Construction Methods AND EQUIPMENT

A McGRAW-HILL PUBLICATION



ROADBUILDING...

INCLUDING

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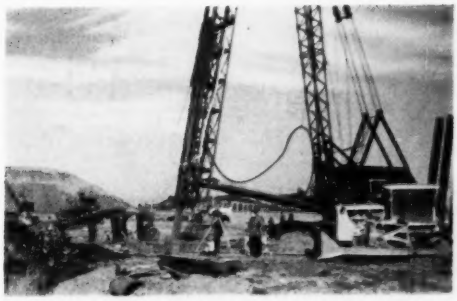

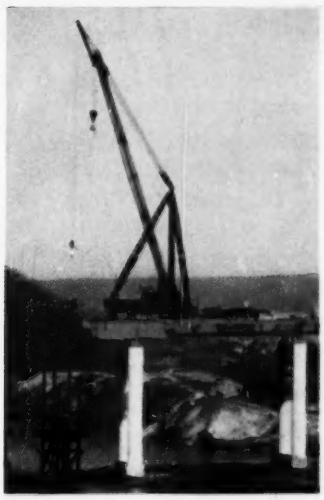

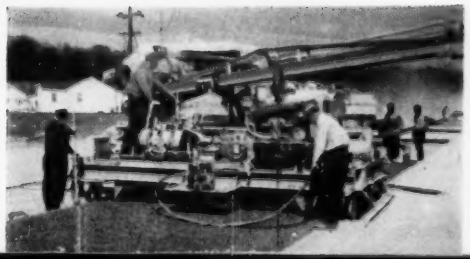

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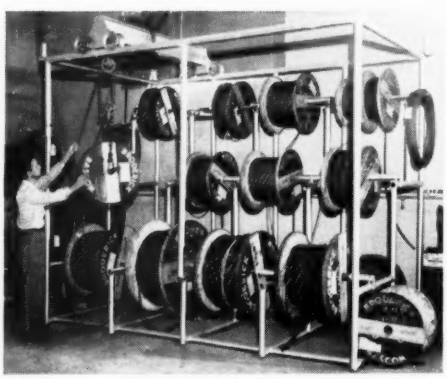

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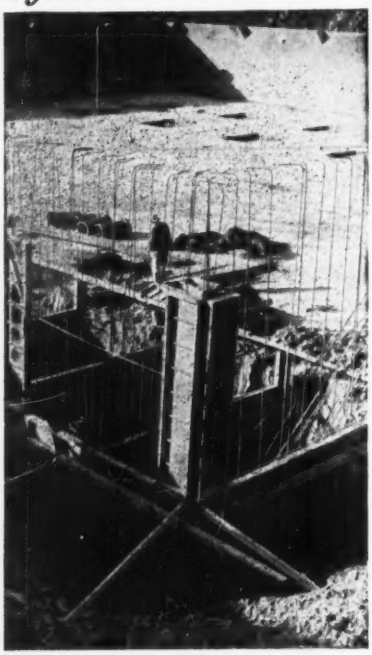
INDUSTRIAL PRODUCTS

Symons FIELD REPORT...



Contractor Saves 40% with Symons Forms . . .

7,500 square feet of Symons Standard Forms were used in the new 2 million gallon capacity pumping station at Melrose Park, Illinois. 2,000 cubic yards of concrete were used on the job and the concrete contractor, Louis Macro Company, Melrose Park, reported a 40 per cent saving through the use of Symons Forms. Walls for the job were completed in three pours.

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General Contractor.

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Construction Methods AND EQUIPMENT

VOLUME 39
NUMBER 1
ESTABLISHED 1919

January, 1957

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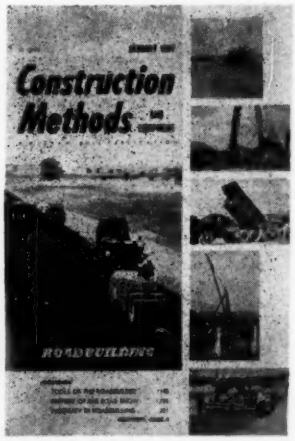

On the Cover

Laying and rolling asphaltic concrete, highballing dirt, driving piles, spreading base stone, erecting bridge steel, placing and finishing portland cement concrete—these are but a few of highway construction's many phases. Because all phases will have to be repeated untold times as the nation hits into the greatest highway program ever undertaken, we devote this issue to the art of roadbuilding.

CONSTRUCTION METHODS AND EQUIPMENT was founded in 1919, under the name of SUCCESSFUL METHODS, by the Manufacturers Publicity Bureau, Inc., of Chicago, representing a group of non-competing manufacturers of construction equipment. Charles R. Thomas, editor of the first few issues, was succeeded by William Jabine.

In 1926 the McGraw-Hill Publishing Company, Inc., of New York, purchased the publication, changing its name to SUCCESSFUL CONSTRUCTION METHODS in November of that year, to CONSTRUCTION METHODS in May 1927, to CONSTRUCTION METHODS AND EQUIPMENT in December 1936, and to CONSTRUCTION METHODS in October 1939. In July 1949, the name CONSTRUCTION METHODS AND EQUIPMENT was resumed. All rights to the foregoing titles are reserved by the publishers.

Robert K. Tomlin was appointed editor of CONSTRUCTION METHODS in January 1928, was succeeded by Waldo G. Bowman in January 1946, by Harold W. Richardson in February 1949, and by Henry T. Perez in June 1954.

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Published monthly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948) Founder.

Editorial, Executive and Advertising offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice-President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Joseph H. Allen, Vice-President and Director of Advertising Sales; A. R. Venezian, Vice-President and Circulation Coordinator.

Subscriptions: Address correspondence to Construction Methods and Equipment—Subscription Service, 330 W. 42nd St., New York 36, N. Y. Allow ten days for change of address. Subscriptions are solicited only from persons engaged in construction or in supplying the construction industry. Position and company connection must be indicated on subscription orders.

Single copies 50¢. Subscription rates—United States and possessions $3.00 a year; $4.00 for two years; $5.00 for three years. Canada $4.00 a year; $6.00 for two years; $8.00 for three years. Other Western Hemisphere and the Philippines $10.00 a year; $16.00 for two years; $20.00 for three years. All other countries $15.00 a year; $25.00 for two years; $30.00 for three years. Second class mail privileges authorized at New York, N. Y. Printed in U.S.A.

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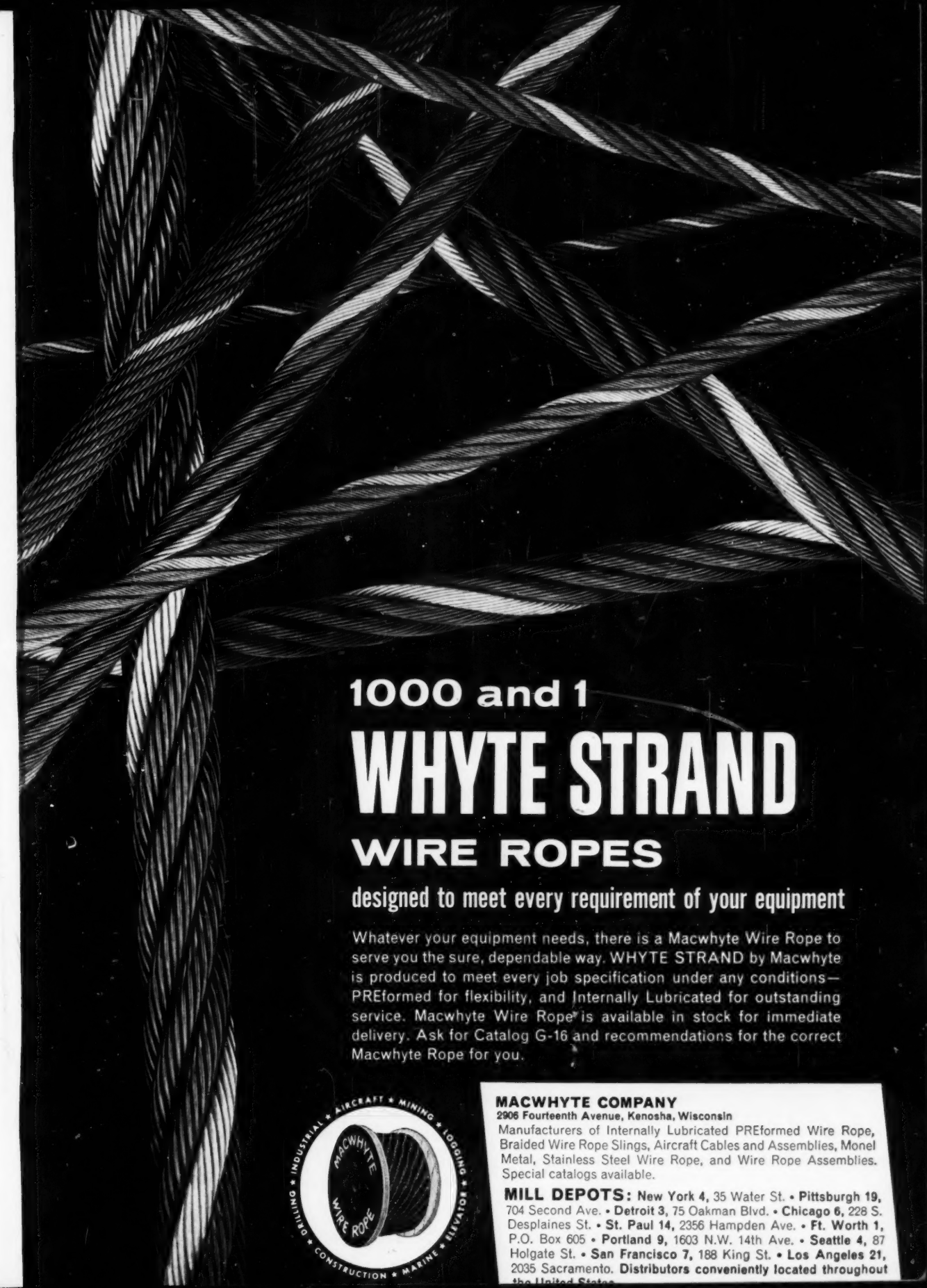

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January, 1957

Pay Dirt in This Issue

They Beat Winter Weather 84
Contractor beats winter with a fast-paced operation highlighted by a central mixing plant for soil-cement.

Electronic Tools Aid Roadbuilders 87
"Wonder Tools" help road contractors gain better construction quantity data on job. Result is faster payments.

Three Plants Pave Florida Pike 90
Big asphalt plants pour out hot mix to complete Florida's 108-mi Sunshine State Parkway late this month.

Concrete Carrier Speeds Deck Paving 113
A job-made rig rides on steel rails and carries concrete from ready-mix trucks to point of placement on bridge.

Freeway Paving Goes Down Fast 121
Bridges and restricted batching facilities fail to slow progress of 2.6-mi paving on a California Freeway job.

Dual Drums Roll Trench Bottom 138
New trench roller proves itself an outstanding performer on a road widening job under way near Gallipolis, Ohio.

Producing Aggregates 245
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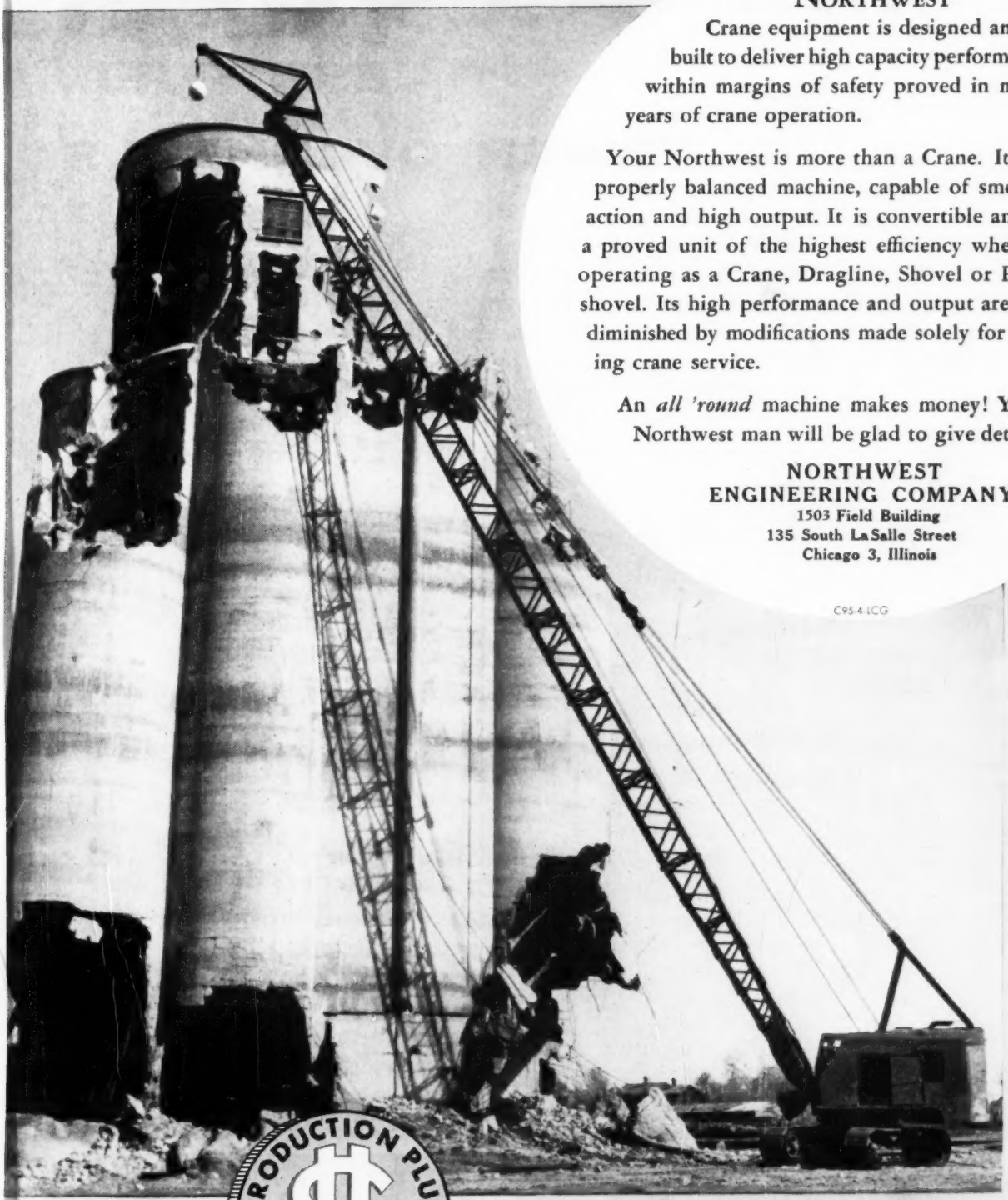
Next Month

Prestressed concrete has grown up. Introduced into this country only a few years ago, it is fast becoming a major industry. Next month we will describe the latest developments in pre-tensioning and post-tensioning.

IT TAKES MORE THAN COUNTERWEIGHT TO MAKE A CRANE!



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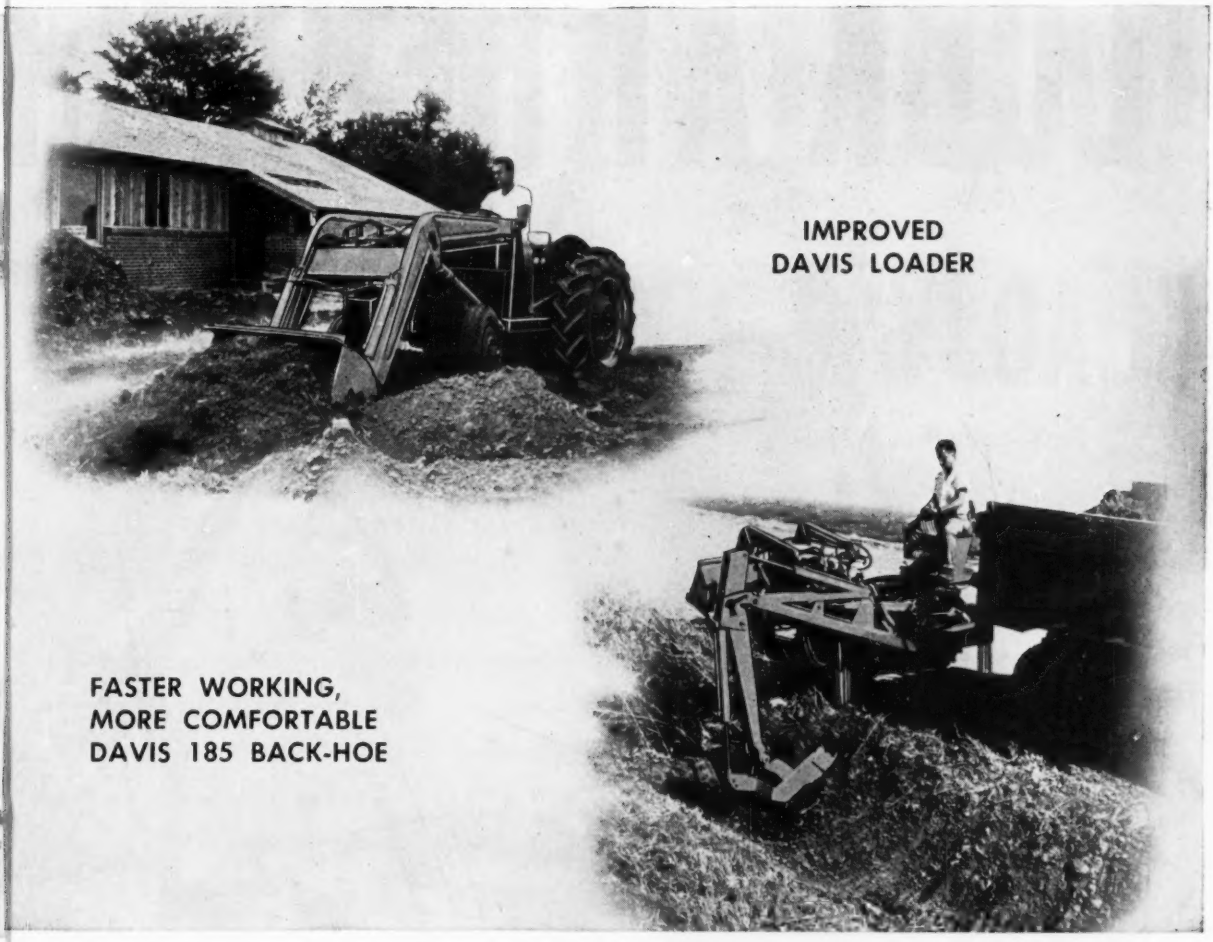

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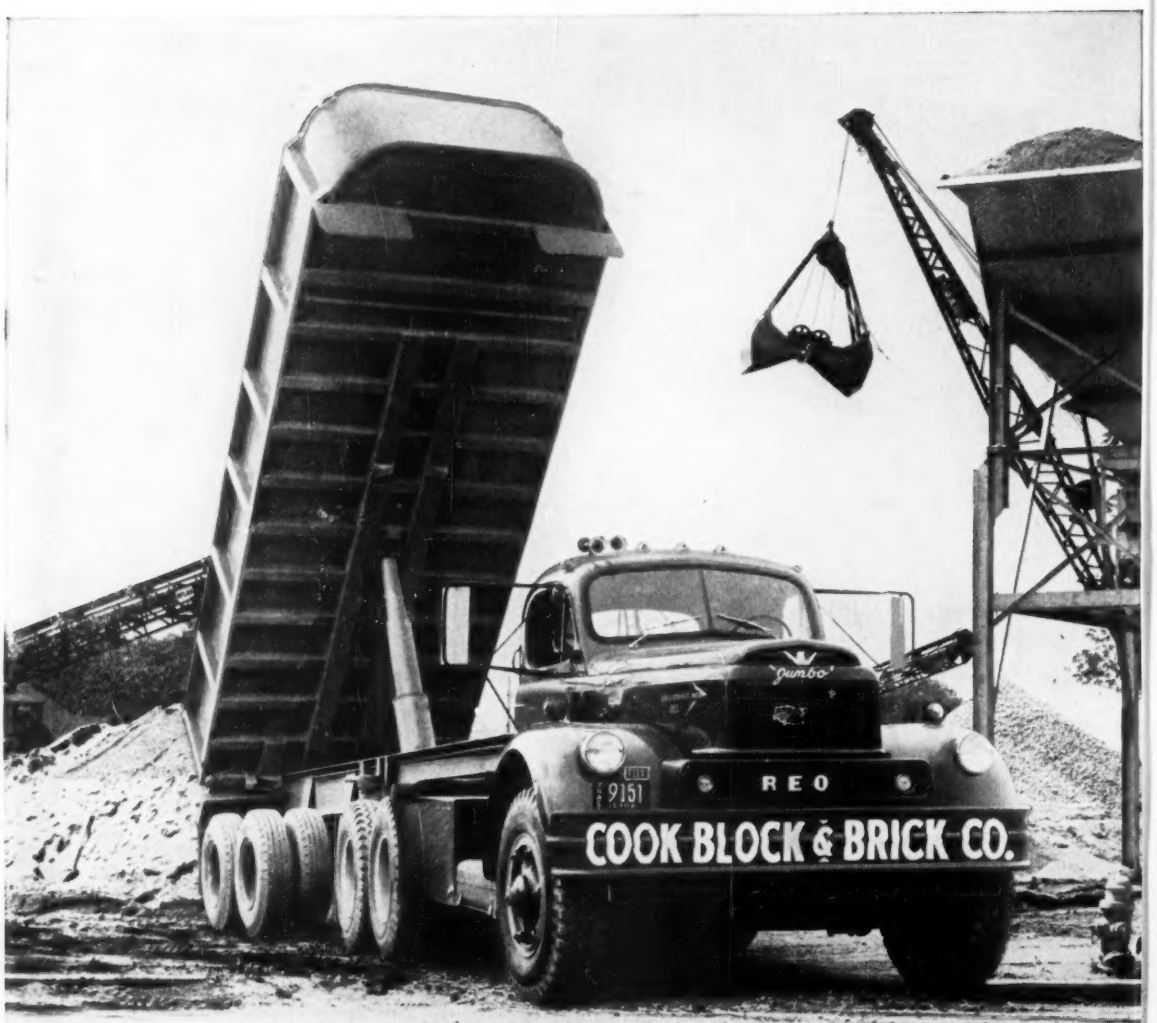

LOOK AT REO IN THE CONSTRUCTION FIELD

Mr. V. E. Cook reports—"We are pulling 72,000 lbs. G.C.W. with Reo's A633-V-8. We were surprised when we weighed the new tractor and found it 2,000 lbs. lighter than other equipment in the 200 H.P. class. Naturally this permits 2,000 lbs. more payload."

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"2000 lbs. MORE PAYLOAD"

. . . says Virgil E. Cook, President, Cook Block and Brick Co., Anderson, Ind.

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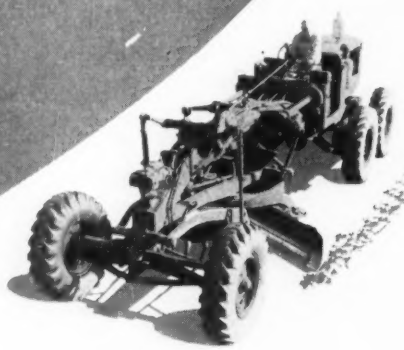

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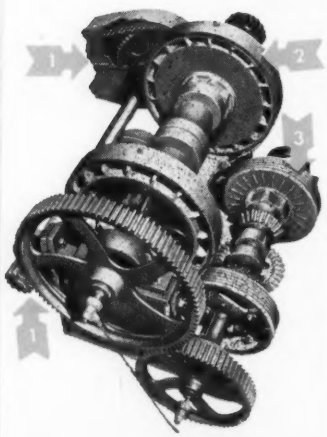
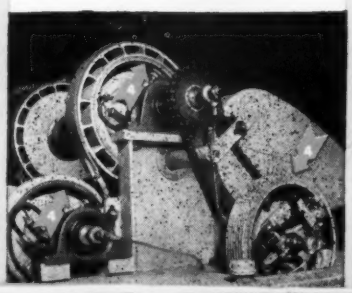
You owe it to yourself to see the new *"QUICK-WAY"* 85A before you buy any shovel at any price. See your distributor for a demonstration and get the real facts on how you can make more money with the husky *"QUICK-WAY"* 85A.

"QUICK-WAY"® TRUCK SHOVEL CO.
A [Koehring] Subsidiary DENVER, COLORADO

THE ONE SMALL





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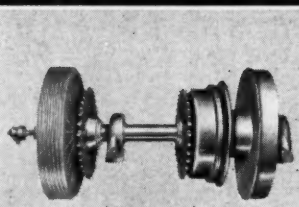
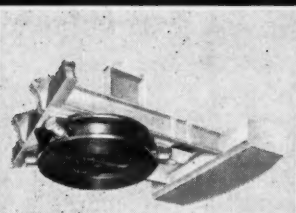
Now you can get the *"QUICK-WAY"* 85A and 105A on a crawler! You get the same *"QUICK-WAY"* Big Shovel Features on the crawler that gets to its job, stays with the work, even in close, restrictive quarters. The new *"QUICK-WAY"* Crawler has independent travel—forward and reverse speeds of 7/8 miles per hour in low range and 1-3/4 miles per hour in high range. It is now available in 16" crawler shoes (5.1 psi ground pressure), 24" crawler shoes (3.5 psi ground pressure), and 32" crawler shoes (2.5 psi ground pressure). Width of 95" has been especially designed for hauling on trailers.

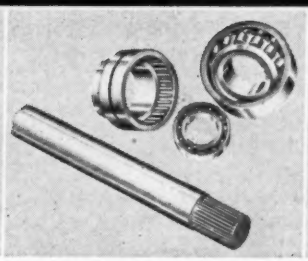
SHOVEL WITH BIG SHOVEL FEATURES



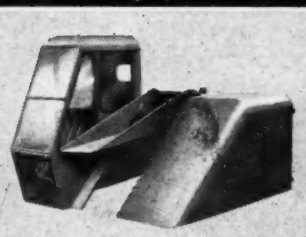
POWER UP AND DOWN BOOM HOIST IS STANDARD — A simple precision design makes safe, sure operation. A one-piece cast steel unit contains pawl teeth, windlass and brake drum. The cable end is located in an easily accessible place for quick attachment change-over.



ONE-PIECE FLOOR FRAME, HEAVY DUTY SWING TABLE GEAR AND HOOK ROLLERS—Floor frame electric welded in jig, then all bearing mounts machined at one time for precision alignment. One-piece, cast steel swing table gear. Four hook rollers distribute load.



ALL SHAFTS SPLINED, ALL ANTI-FRICTION BEARINGS — All shafts extra large for maximum strength, precision splined for easy maintenance. Anti-friction bearings used on all high-speed, continuous rotating shafts and drums. All shaft bearing surfaces are precision ground.



MACHINERY HOUSING DESIGNED FOR COMPLETE, EASY ACCESS—to all machinery. New feature is an automobile hood-type cable trough cover that lifts high for complete access to central machinery. New cab has 360° vision through removable safety-glass windows.

THE MOST COMPLETE LINE...WITH 5 MODELS IN THE SMALL SHOVEL FIELD!

105A & 105AC
5/10 YD., 10½ TONS

125A
6/10 YD., 12½ TONS

with the famous money-making line of "QUICK-WAY" attachments for all models

Get these important books . . . free!

- ☐ The new catalog on the *"QUICK-WAY"* 85A and 85AC Crawler.
- ☐ The new catalog on the *"QUICK-WAY"* 105A and 105AC Crawler.
- ☐ The new catalog on the *"QUICK-WAY"* 125A.

"QUICK-WAY" TRUCK SHOVEL CO., Dept. 47
2401 East 40th Ave., Denver 5, Colorado, U.S.A.

Name.....*Title*.....

Company.....

Address.....

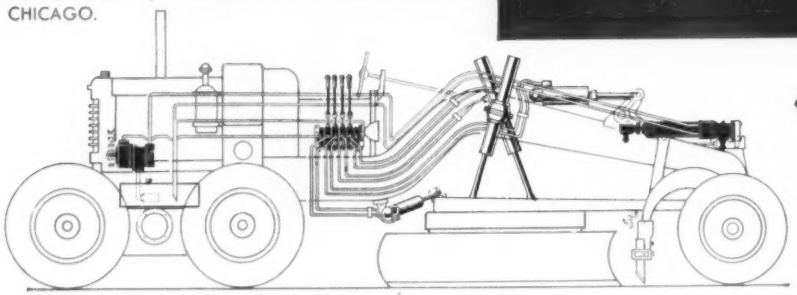
City and State.....

"Nobody puts a fine painting in a dime-store frame." When you see a piece of construction equipment with Vickers Hydraulics, you know it is a "quality" machine throughout.

Vickers provides all the inherent advantages of hydraulics and MUCH MORE: (1) the benefits of a nation-wide and full-time field engineering and service organization of unequalled experience; (2) a complete line of equipment enables Vickers to take UNDIVIDED system responsibility thus eliminating any risk of incompatibility of hydraulic components; (3) a hydraulics school for free training of customers' maintenance personnel.

SEE VICKERS HYDRAULICS IN SIMULATED ACTION IN BOOTH 219 AT THE ROAD SHOW, JANUARY 28 TO FEBRUARY 2, AT INTERNATIONAL AMPHITHEATRE, CHICAGO.

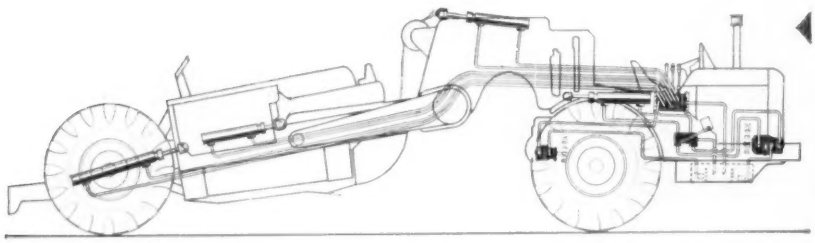
VICKERS® HYDRAULICS *means* "QUALITY" CONSTRUCTION EQUIPMENT



Motor grader uses Vickers Hydraulics for:

- maximum blade utility
- accurate and effortless tool adjustment
- positioning scarifier
- convenience of control to operator

Hydraulic motor (not shown) rotates blade on circle. Hydraulic power steering is separate circuit. Central hydraulic system is applicable.



Scraper has VARIABLE rate hydraulic power steering provided by:

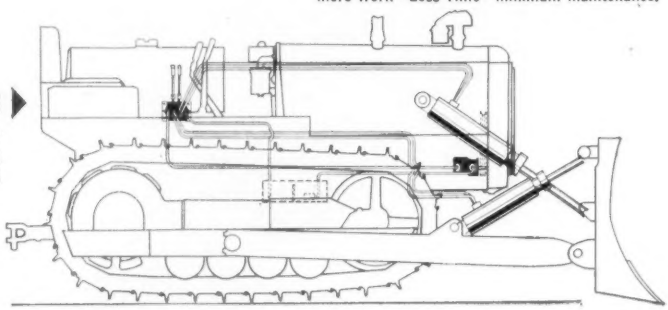
- Vickers Double Vane Pump
- Vickers Metering Control Valve
- Vickers Circuit-Splitting Unloading System
- Vickers Overload Relief Protection

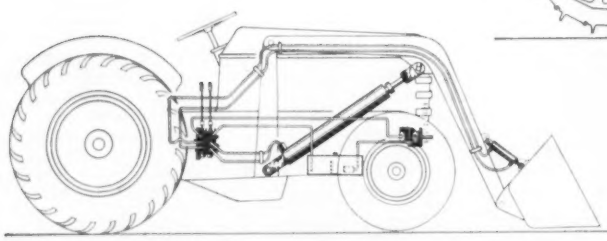
Vickers Single Vane Pump supplies power for:

- Fast actuation of bowl
- Fast apron manipulation
- Fast—Positive ejector action

More Work—Less Time—Minimum Maintenance.

Vickers Hydraulics provides fast lifting and angling of bulldozer blade along with exclusive "feathering" ability. Additional tractor attachments added later can be hydraulically controlled by simply adding sections to existing control valve thus eliminating necessity of mounting separate valves.





Fast, easy and dependable operation of front end loader utilizes Vickers Balanced Vane Pump (with inherent automatic wear compensation) and Vickers Two-Section Directional Control Valve. Note simplicity of installation.

SEE VICKERS BOOTH 219
A. R. B. A. ROAD SHOW • JAN. 28-FEB. 2
INTERNATIONAL AMPHITHEATRE, CHICAGO

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7695

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Construction News From Washington

Washington, D.C.
January, 1957

$40 Million a Week

Rate of contract awards for projects on the interstate highway system will have to be stepped up to $40 million a week if the states are to meet construction schedules for the new road building program. Some states will have to double or even triple their volume of contract awards, which have been running around $20 million a week nationally.

Approval of final plans for projects is the key to the rate of contract awards in each state. The Bureau of Public Roads is keeping tabs on the rate of awards in each state as compared with federal funds allocated. When a state falls behind the programmed rate, both the Bureau and the American Association of State Highway Officials offer advice and assistance to the state highway commissioner—and even to the governor of the state—to help raise the level of contract awards.

Overall, state highway departments in the next three years will be building more than twice the amount they placed under contract in the last three years. Financing of this expanded construction program won't be so much of a problem to the states, however. Fully half of them will be able to take care of their share of the load without any change in highway user taxes. Legislatures of the remaining states, meeting this month, will have to take up proposals to increase highway revenues. For all states as a composite group, only 10% to 15% more in state funds will be needed to meet the requirements of the next three years.

Working Out Details

Important details of the new interstate highway building program are being modified from time to time as both state and federal officials translate the basic legislation into concrete and asphalt.

For instance, private estimates from Bureau of Public Roads officials say that only two-thirds of the 41,000 miles must be relocated. When the program was being talked over with Congress last year, the best estimates were that some 85% to 95% of the super-highway network would have to be relocated. The mileage that will remain in its present location will be mainly in the east and in metropolitan areas.

Interchanges will be from 3 to 10 miles apart in the eastern part of the country, officials say, and farther apart in the west.

New study on materials requirements per million dollars of contract construction is being completed in sections by the Bureau of Public Roads. The first two, on aggregates and steel, now are available.

Continued on next page

Pension Funds for New Construction

Unionized electricians have shown building trades unions how to put their pension reserves to work creating more work for construction craftsmen and their contractor employers.

The International Brotherhood of Electrical Workers, in cooperation with the National Electrical Contractors Association, has earmarked the $1 million a month that flows into the union's pension and life insurance funds for new home construction in eight closed-shop cities. The fund trustees invest the money in government-backed mortgages on new houses under an agreement whereby the builders utilize the cash received to make a prompt start on additional new homes.

If other pension funds follow the electricians example, tapping of this source for home building could break the tight-money log-jam in mortgage financing. Pension funds are growing at an increasing rate that already amounts to about $2.5 billion a year. Fund reserves to date, invested mainly in government and corporate securities, exceed $25 billion.

$420-Million Green Light

A $420-million hydroelectric project to be built by the state of California on the Feather River now has clearance from the Federal Power Commission. The FPC issued a construction license to the California Water Project Authority requiring work to begin before December, 1959, and all structures, including massive Oroville Dam and power plant, to be completed and in operation by December, 1966. The Oroville structure is to be a 730-ft concrete gravity dam with five steel penstocks feeding 118,000-hp turbines direct-connected to five 88,000-kw generators.

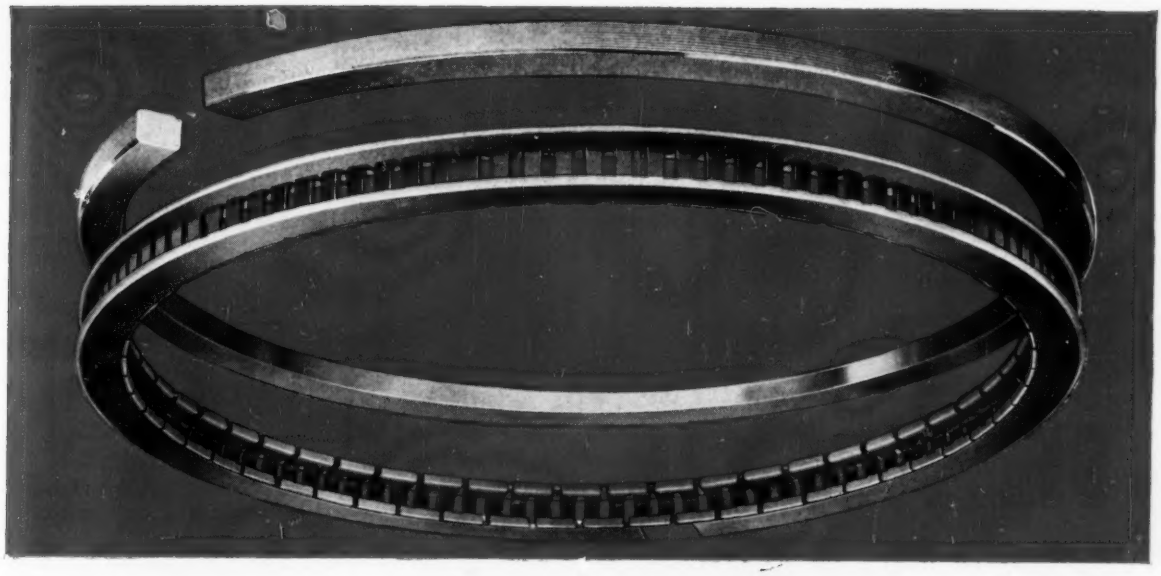
Flaming Gorge Contracts

Major contracts will be awarded this year for the $85-million Flaming Gorge Project of the $1 billion Upper Colorado River Development. The U. S. Bureau of Reclamation expects to award the diversion tunnel—1200 ft long, 26-ft dia, unlined—in May and the prime contract for the $60-million gravity dam, with a structural height of nearly 500 ft, by December. The job, on the Green River 32 air miles north of Vernal, Utah, is handled by the Salt Lake City office of the Bureau.

Hiring Government Engineers

Government contractors who hire a government engineer get a sour look from a House Civil Service Committee looking into the problems government agencies have in keeping professional personnel.

Corps of Engineers, Bureau of Yards and Docks, and Air Force feel the pinch when they lose trained men, the committee says.



PERFECT CIRCLES

ARE THE NO. 1 CHOICE

OF CONSTRUCTION CONTRACTORS

A recent impartial and authoritative Brand Preference Survey* conducted among contractors shows that of 17 different brands of piston rings PERFECT CIRCLES ranked first—two to one—over the nearest competitor.

TWO SIMPLE REASONS

1. LONG LIFE—LESS DOWN TIME

Perfect Circles are plated with thick, wear-resisting solid chrome that more than doubles the life of cylinders, pistons and rings. Assures thousands of extra hours of sustained power with positive oil control. Means less down time—longer periods between overhauls and more profitable operation per unit.

2. AVAILABILITY

You're always close to a Perfect Circle source of supply! Perfect Circle piston ring sets are distributed by leading automotive parts wholesalers in 90 different countries and territories. And PC supplies rings for practically every power application—from air compressors to bull dozers!

PERFECT CIRCLE

PISTON RINGS

**Name on request*

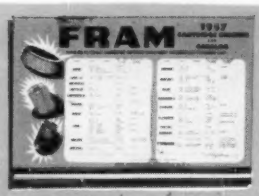
PERFECT CIRCLE CORPORATION, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Don Mills, Ontario

YOUR NEW 1957

FRAM FLEET SERVICE PROGRAM

MEANS DOLLARS AND CENTS FOR YOU!

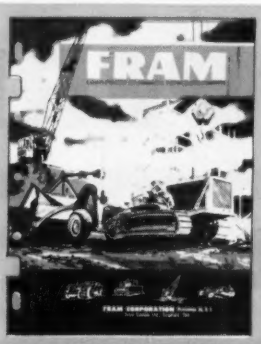
OIL FILTER CARTRIDGE MANUAL
complete data for filter cartridge replacements on cars and light trucks through 1957.



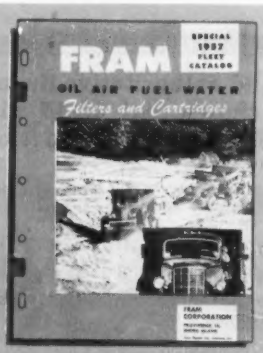
CARTRIDGE CHECKER CHART
shows correct FRAM Cartridges for every filter.

SPECIAL FLEET DECAL
identifies correct cartridge replacement when placed on filter body.

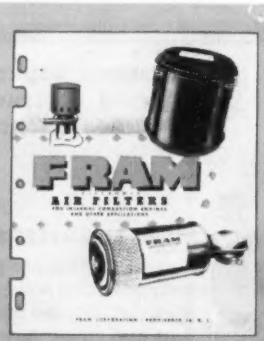
FLEET MAINTENANCE WALL CHART
handy and permanent guide to correct FRAM Filter Cartridge for every piece of equipment in your fleet.



ROAD EQUIPMENT MANUAL
complete list of FRAM Oil Filter cartridge replacements.



FLEET CATALOG
with survey sheet to record FRAM FILTER requirements of your fleet.

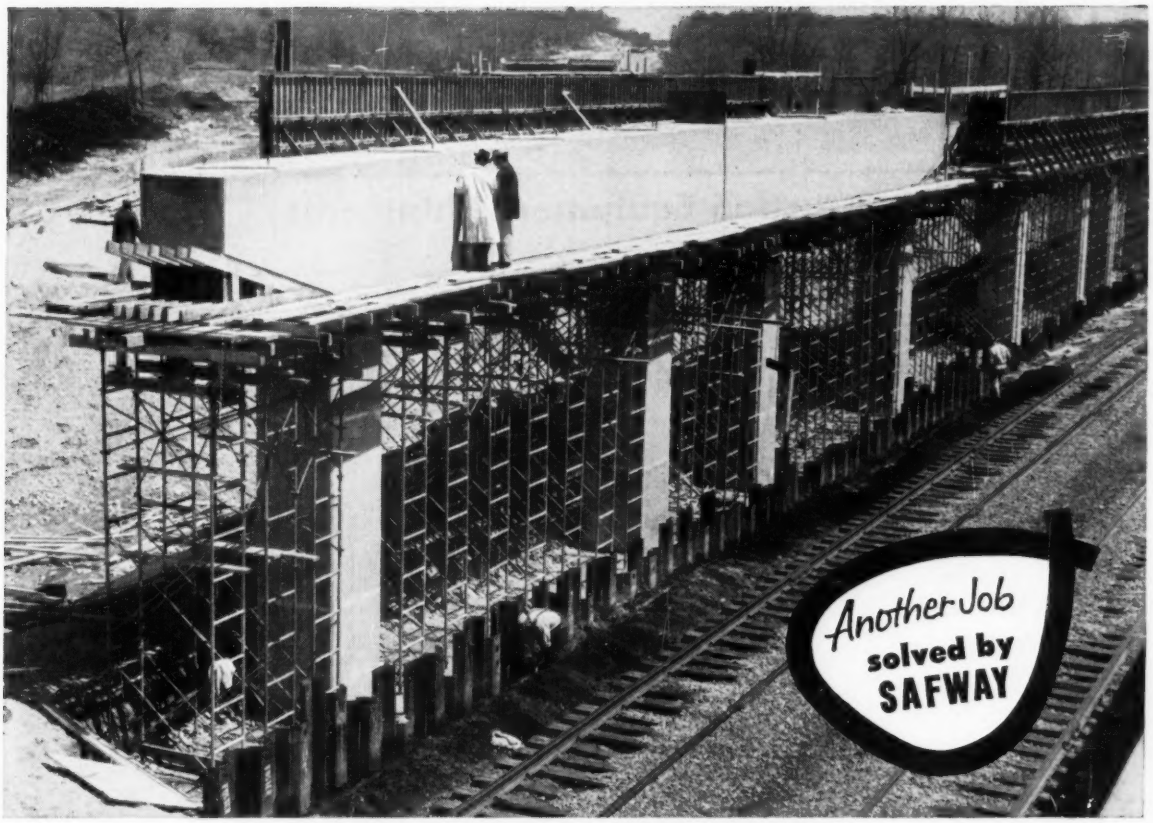


AIR FILTER CATALOG
complete information for air filter replacements and servicing.

These valuable service aids will help you keep your fleet on the road around the clock! See your FRAM representative now!

FRAM
OIL • AIR • FUEL • WATER
FILTERS

FRAM CORPORATION, Providence 16, R. I.
Fram Canada Ltd., Stratford, Ontario



Shoring a 4'x6'x87' Bridge Beam on the Massachusetts Toll Road

Bridge Shoring Method Saves 60%

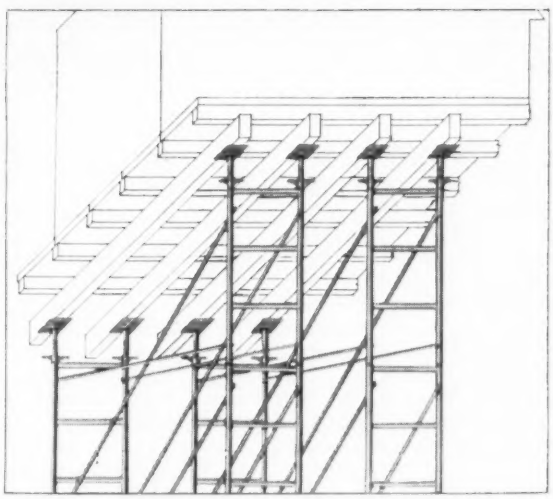
SAFWAY STEEL FRAME SCAFFOLD CUTS TIME AND MATERIAL COST

THIS 4 BY 6 FT. BEAM was shored with Safway steel scaffolding for faster handling, greater convenience, safety and lower ultimate cost. And overall savings amounted to about 60% of the cost of ordinary timber shoring, according to the M. De Matteo Construction Co., who handled the job.

Loads are carried on the tubular steel legs of the scaffolding, braced in two directions. Careful calculation established the number of scaffold frame legs and size of wood beams and joists required to support the concrete. Extended platforms made it easy for men to set and strip side forms.

Safway scaffolding goes up quickly, without tools. Screw jacks compensate for uneven ground and permit final leveling of formwork. As work progresses, complete shoring towers can be moved without disassembly. And the contractor recovers 100% of his scaffold equipment.

CONSULT SAFWAY ENGINEERS—Learn how you can cut shoring costs! Call your nearby Safway office for planning and erection service—ample stocks are available for *sale* or *rental*. Submit job details for recommendations (no obligation). And **WRITE TODAY FOR BULLETIN 21.**



Proper spacing of shoring columns is determined by total load and capacity of the lumber. Safway scaffold frames are available in a number of sizes to meet every spacing requirement, permitting beam loads to be carried directly on column legs rather than horizontals.

SAFWAY
STEEL PRODUCTS, INC.
6243 W. State St., Milwaukee 13, Wis.

Shipments of Equipment Rise

CONSTRUCTION EQUIPMENT makers shipped out a record dollar value of construction machinery during the third quarter of 1956. The CM&E Index of Domestic Shipments racked up a third quarter record of 239, based on 1949 = 100. This is 19% higher than the corresponding three months period of 1955, but it is down seasonally from the all-time high of 315 in the second quarter.

For the first nine months of 1956, the CM&E Index points to a whopping 31% increase over 1955 in dollar value of domestic shipments of construction machinery.

When reports are in for the fourth quarter, shipments are expected to show an upturn from the third quarter dip. This is because orders for the last quarter of 1956 were forecast to increase 10%, according to the New Orders Index computed by the McGraw-Hill Department of Economics (see chart.) The forecast of the Orders Index, based on individual forecasts of a sample of manufacturers, is 262 (1949 = 100), which is a new all-time high for any quarter.

The upturn in orders and shipments is expected to continue into the first quarter of 1957 when the Orders Index is forecast to set still another record high of 267.

However, current feeling among some equipment makers whose estimates go into the hopper to make the Orders Index forecast is that their new orders may start to taper off in the second quarter of next year. Moreover, they see a moderate decline continuing into the third quarter. One of the reasons for this is the fact that some manufacturers have found that actual orders have not lived up to expectations. The latest forecasts for the last quarter of 1956 and the first three quarters of 1957 were about 4% below the predictions made last August.

Though the forecast of orders points to a possible moderate decline beginning in the second quarter of next year, the 1957 forecasts average 2% higher than actual orders received during the first nine months of 1956.

CM&E has forecast that 1957 shipments would top 1956 by 10%. This forecast still stands and is based on the preliminary forecast of a further 10% rise in new heavy construction contract awards next year. The 10% increase forecast for shipments also includes an estimated 4% rise in equipment prices next year compared with 1956.

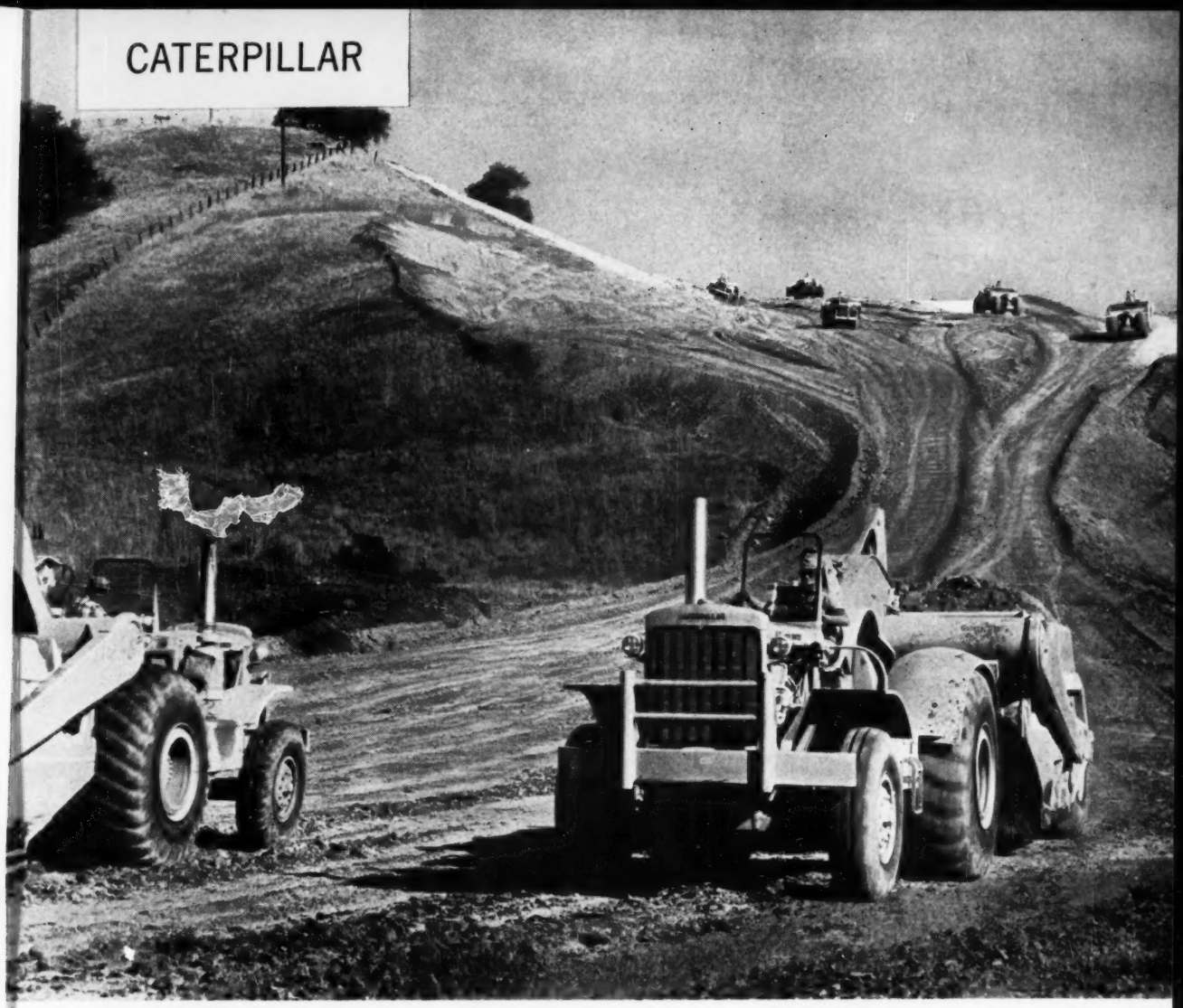
Certainly the construction equipment industry will be happy with another sales year like record-smashing 1956. As of now, prospects look good for an even better year.

1956 Contract Awards Set Record

HEAVY CONSTRUCTION contractors ended 1956 with more new business and probably more profits than in any other year in history. Construction contract awards piled up to a new all-time dollar record of $21.7 billion. This is 16% more than previous high in 1955.

As the demand for new construction mushroomed during the

continued on page 26



THE ROAD AHEAD

America's new highway program is a 50-billion-dollar challenge to the nation's road builders. Success of the greatest building project ever conceived by man rests with them alone

America has handed the new Federal-aid highway building program to the nation's road builders with complete confidence.

In the next 13 years, the U.S.A. will spend 50 billion dollars building Federal-aid roads alone. From the program will rise a magnificent 41,000-mile system of Interstate Freeways. It totals up to the greatest building project in history.

Only this nation could have the vision for such a program. For only America has the need for it . . . and the resources to see it through to completion. And only America—unawed by bigness—could start such a program without a doubt of its success . . . a magnificent tribute to the nation's road builders.

But make no mistake about it. This is a 50-billion-dollar challenge. It will take co-ordination, co-operation, and the combined experience of the nation's contractors, engineers, Federal and State road officials, bankers, material producers and equipment manufacturers. They start with the nation's confidence. Will they be able to hold it on the long road ahead? The next two pages will give you a clue.

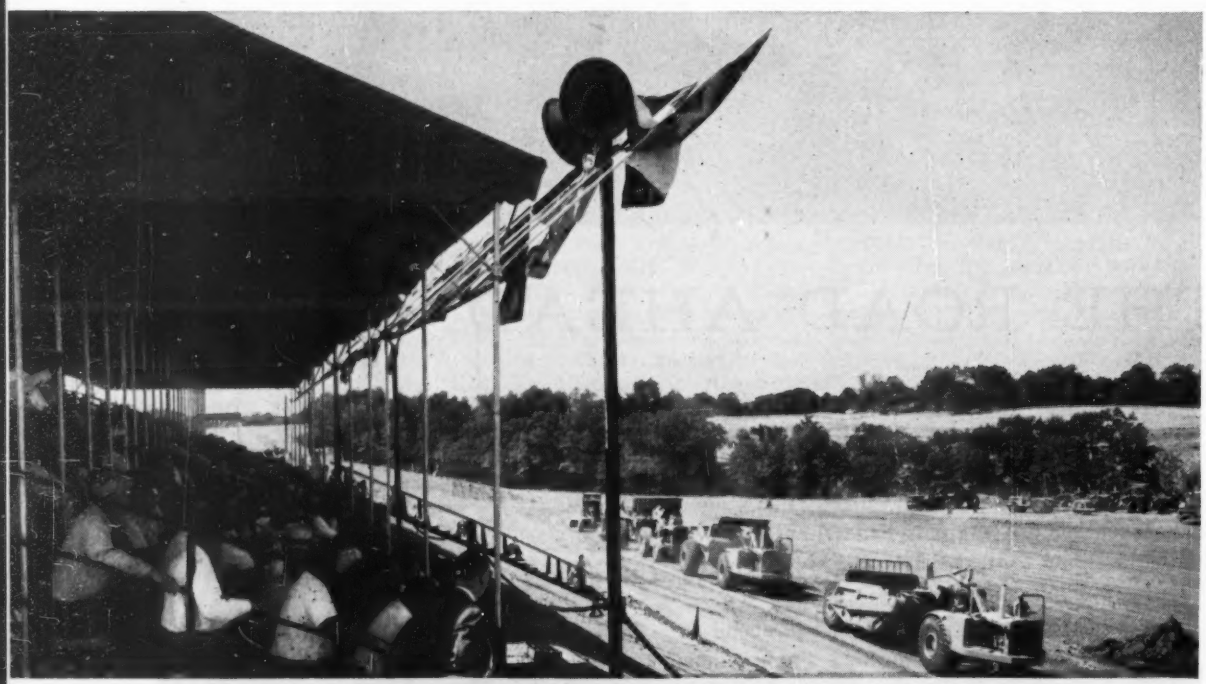
CONTINUED

ROAD BUILDERS RISE TO THE CHALLENGE BY WORKING TOGETHER AS NEVER BEFORE

The key to America's fabulous road-building program is co-operation. The men who must make it work are a diversified group—bankers, engineers, contractors, government officials, materials producers, equipment manufacturers. But they are united today by *one goal* and are setting an example of industry co-operation rarely equaled. Here are some examples of how an equipment manufacturer is co-ordinating its activities with all other groups.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

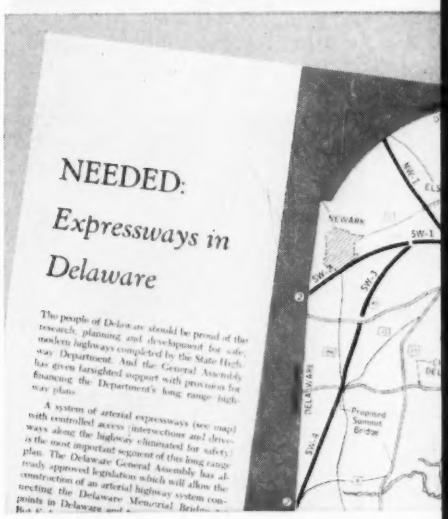
*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



BANKERS AND EQUIPMENT MANUFACTURERS. Some 180 bankers from every sector of the U.S.A. view the latest earthmoving equipment at the world-famous Caterpillar proving ground in Peoria. A two-day program gives them a close-up of new and improved CAT* equipment—like the giant D9 and the new DW21 with its high-capacity LOWBOWL Scraper—which they finance for contractors. A show like this bolsters confidence—makes credit easier.

CONTRACTORS, GOVERNMENT OFFICIALS, MATERIALS PRODUCERS AND EQUIPMENT MANUFACTURERS. The 1957 Road Show in Chicago this month will demonstrate to contractors, government officials and materials producers that the equipment is ready for the job ahead. Caterpillar's exhibit will feature the new road program in detail and will spotlight the machines on which contractors will depend to accomplish the job.

STATE OFFICIALS AND EQUIPMENT MANUFACTURERS. This Caterpillar leaflet helped road officials in Delaware get important limited access legislation approved. Caterpillar first featured Delaware in a national advertisement, then local Caterpillar Dealers sent reprints like this to legislators and other interested persons in the state explaining the need for limited access legislation. Bill passed soon after.



NEEDED:

Expressways in Delaware

The people of Delaware should be proud of the research, planning and development for safer, modern highways completed by the State Highway Department. And the General Assembly has given farsighted support with provisions for financing the Department's long range highway plans.

A system of arterial expressways (see map) with controlled access (intersections and driveways along the highway eliminated for safety) is the most important segment of this long range plan. The Delaware General Assembly has already approved legislation which will allow the construction of an arterial highway system connecting the Delaware Memorial Bridge-

ENGINEERS AND EQUIPMENT MANUFACTURERS. Exhaustive on-the-job tests are made on newly designed equipment to help engineers figure capacity, speed of production. Engineers base their estimates and contracts on the known production capabilities of machines—they depend on those machines to perform with minimum down time. Here the Caterpillar DW21 Tractor with No. 470 LOWBOWL Scraper helps meet the engineers' challenge on the Florida Turnpike.

IT'S YOUR BUSINESS . . .
continued from page 22

year, old records fell for many types of work. Highway contracts climbed 16% to a new high of $2.5 billion. Sewerage contracts jumped 44% to a record $579 million, and waterworks rose 13% to a new high of $356 million. Earthwork, irrigation and drainage (includes jobs like dams, levees, and waterway development) soared 34% to a whopping $730 million.

Bridge contract awards scored a 14% increase to $622 million, second best year on record.

The big gains for all of these major types of work pushed heavy construction contracts, excluding buildings, to a thumping $6.6 billion. This was 10% above 1955's previous record of just under $6 billion.

Industrial plant contracts rose faster than any other major type of heavy construction with a spectacular 81% gain to a record $5.3 billion. In fact, this total put industrial building at the top of major types of work in dollar value of contracts awards for the first time since 1951.

Commercial building also chalked up a new high as it rose 24% to $2.1 billion. It was the fifth consecutive yearly record for commercial building. Public building construction turned in a handsome gain of 21% to $2.1 billion, and public housing rose 29% to $318 million. But both types of public building construction were below their record highs.

Private mass housing was the only major type of construction that failed to make a gain. Dollar value of awards slumped 14% under the 1955 record as industry and other borrowers attracted funds away from the mortgage market. Even so, the 1956 mass housing total was second highest on record.

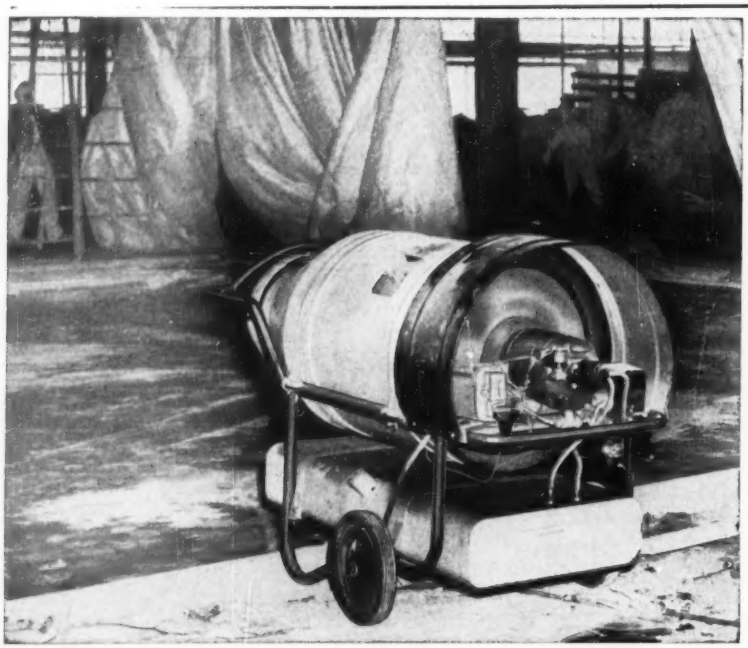
Construction Costs and Prices Up

The unprecedented demand for new construction set the stage for a sharp rise in construction costs and in contractors' selling prices. Costs rose 4.5% during the year, and contractors upped their prices even more than the increases in materials, manpower, machinery, and money costs. Highway bid prices rose 8.6% on federal-aid highway projects let during the year, while 10 state highway departments reported bid prices up from 10% to 35%. Bid prices on heavy engineering projects like dams, hydro-power plants, tunnels, and canals rose about 9% during the year.

Part of the reason for the faster rise in contractor prices than in the prices they pay for materials, labor, and equipment is that the booming market allowed contractors to improve their profit margins. Rising costs and stiff competition squeezed profits during the period from 1953 through early 1955. Though no statistics are available, profit margins probably improved considerably in 1956.

Record Failures Despite Boom

Though new business boomed, a record number of construction contractors went bust in 1956. By the end of November, contractor failures had reached a high of 1,651, 30% more than 1955's previous high for the period. Moreover, the net increase of nearly 400 failures is by far the largest year-to-year rise during the post-



Here's the business end of a heater

When you buy a heater, don't stand in front of it; stand behind it. All heaters are hot in front, but their value to you depends on the rear end.

If you want *circulated warm air* indoors, *powerful spot heating* outside, if you want to *dry plaster,* pour and *cure concrete* and *keep the job rolling* in any weather, you need a Master heater.

It's a compact furnace-on-wheels, with starter, fan, thermostat, filter, pressure atomizing burner, insulated fire chamber and all. It rolls into place, starts at the flip of a switch, needs no vent and burns low cost kerosene or fuel oil.

We think it gives you more good heating for your money than any other type heater. Write for the free folder "Summer Warmth in Winter" or call your Master Distributor and see if you don't agree.

MASTER VIBRATOR COMPANY
309 Stanley Ave., Dayton 1, Ohio

MASTER

RIGHT NOW... is the time to "Feature Check" the NEW

MADSEN HOT ROD ASPHALT PLANT

As the big road-building program swings into high gear . . . MADSEN offers the industry the sensational new Model 391 HOT ROD Asphalt Plant. You will want to check this plant feature-by-feature because it incorporates many engineering advancements never before offered in any asphalt plant. The HOT ROD has no "excess baggage". It is streamlined in design and very easy to service. It has a minimum of removable parts for transport, a good bin capacity and a choice of mixer sizes. Its simplicity and ease of operation can mean a daily increase in production of a 100 batches over conventional asphalt plant operation. The 5000-lb. MADSEN HOT ROD Plant is capable of producing up to 250 T. P. H. of close specification mixes. No other Asphalt Plant matches the New MADSEN HOT ROD in years-ahead features. A few of these features are shown below . . . check them and then get the complete story from your MADSEN distributor.

- New fully-enclosed (running in oil) gear box reduction unit that goes right to the mixer shafts . . . eliminates exposed mixer timing gears.
- Famous MADSEN Twin-Shaft Pug Mill Mixer (Patented) with externally removable sectional liners, improved mixing action and faster discharge.
- Simplest, cleanest design in the industry . . . with a minimum of removable parts for easy transport and fast set-up.
- MADSEN Asphalt Pressure Injection System with new rotating distribution bar (Patented) . . . injects the asphalt into the mill quickly—cuts it off sharply to give you improved mixing and reduced mixing time.
- Available in 3000-lb., 4000-lb. and 5000-lb. batch capacities.
- Operator station on end of plant . . . with swivel-head asphalt and aggregate scales and all controls conveniently located for easy, fatigue-lessening plant operation.
- Fast air operation of bin gates, asphalt pressure injection system and mixer gate.
- Exclusive bin design (Patent Pending) eliminates segregation.
- In-built breathing device.

SEE US AT THE ROAD SHOW
SECTION D ANNEX
BOOTH 702

MADSEN Equipment that Serves

Ask your Madsen Distributor for Catalog No. 391 or write Madsen Works, Baldwin-Lima-Hamilton Corp., Construction Equipment Division, P.O. Box 38 La Mirada, Calif.

THE MADSEN LINE OF PRODUCTS
FOR THE ASPHALT PAVING INDUSTRY
INCLUDES

ASPHALT PAVING PLANTS • PUG MILL MIXERS • AGGREGATE DRYERS • DUST COLLECTOR UNITS
ROAD PUG TRAVEL-MIX PLANTS • WEIGH BATCHERS • SUPER FLOAT AND JOHNSON FLOAT FINISHERS
ASPHALT TANKS • ROYAL CROWN PUMP VALVES • ASPHALT AND FUEL PUMP UNITS

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CONSTRUCTION EQUIPMENT DIVISION
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ACRES OF DAYLIGHT

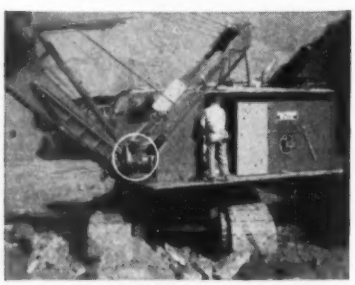
for the night shift with ONAN power

For night lighting on big projects an electric plant should combine high capacity with mobility . . . *high capacity* to handle a bank of powerful floodlights . . . and *mobility* to simplify frequent moving on the job site.

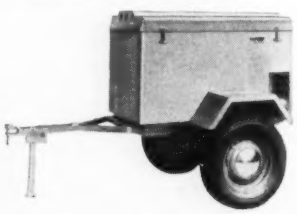
The Onan 10CW electric plant meets both requirements. It delivers 10,000 watts A.C., yet it weighs only 800 pounds. It is completely Onan-built, with a heavy-duty Onan 2-cylinder, gasoline engine direct-connected to an Onan all-climate generator in a permanently-aligned, compact, long-life unit. Starts instantly in any weather. Air-cooling eliminates trouble from freezing or leaking coolants. Available also as a 7,500-watt unit.

Put these mobile, high-capacity units to work on your next lighting job.

Onan 10CW mounted on a portable, skid-mounted floodlight tower. This unit is being used for night operations on a St. Lawrence Seaway project.



Onan 3KW Series 3DSP Diesel electric plant mounted on shovel—lights cab and work area.



Trailer-mounted 10CW. Tow it anywhere behind car or truck. Weatherproof housing.

500 to 75,000 watts

Lightweight, portable, gasoline-powered plants: *500 to 10,000 watts.* Water-cooled plants: *10,000 to 75,000 watts.* Air-cooled Diesel Plants: *3,000 and 5,000 watts.*

See us at *the* ROAD SHOW in CHICAGO

Members: AED and IRF

Onan ELECTRIC PLANTS

D. W. ONAN & SONS INC.

2867 No. University Ave. S.E., Minneapolis 14, Minnesota

IT'S YOUR BUSINESS . . .
continued

war period, according to Dun & Bradstreet figures.

But it's significant that nearly all of the rise has been in general building contractors or special trade contractors. The startling 58% jump in the number of failures of general building contractors reflects the slump in the housing market. This may have also been partly the reason for a 16% increase in failures of special trade contractors.

Failures among other contractors continue small in number—88 for the first 11 months of 1956—but the 29% increase over 1955 is not encouraging.

Though the number of contractor failures is increasing rapidly, it is very small relative to the total number of firms active in the field—only about 0.4% of the latest count of 475,000 firms (as of December, 1955.) The fact that failures have nearly doubled since 1951, however, is a warning signal to the contracting industry that increasing competition will put its good business sense and careful bidding practices to stiffer tests.

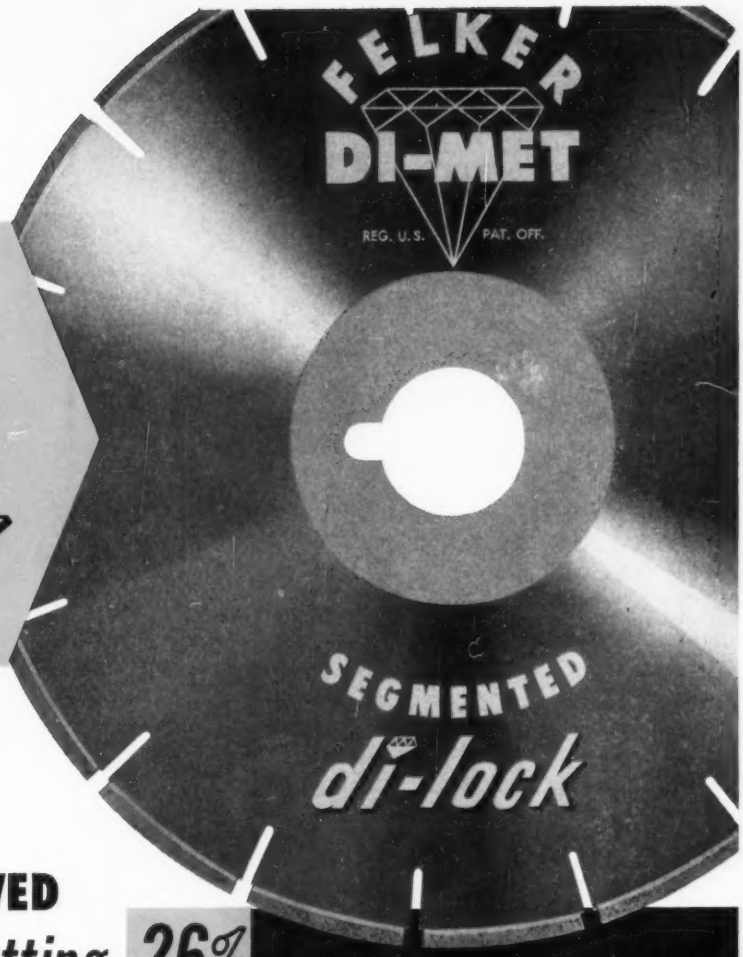
1957 Outlook

This year CM&E expects a continuation of the "tight money" problems which trouble construction planning. However, CM&E expects heavy construction contracts to top last year by about 10%. Most of this expected rise will be due to federally sponsored programs—highways, particularly.

The tight credit reins held by the Federal Reserve Board, with the Administration's blessing, will continue to hold down the construction boom and stretch it out. This means that the 1957 rate of growth in new heavy construction business will again be slower than the rise in demonstrated need.

That the basic construction needs of the country have been growing fast is shown by the CM&E Backlog of Proposed Heavy Construction, which increased 14% during 1956 to a record-breaking high of about $105 billion. This is a gain of more than $11 billion, the sharpest 12-months rise ever recorded for this backlog of construction in the planning stage. This backlog is the biggest single reason why contractors can confidently expect a further rise in the volume of new work available.

Continued on page 340



Another Felker First!

FELKER *di-lock*

A GREATLY IMPROVED DIAMOND BLADE *cutting* 26% *to* 70% *more footage in concrete!*

Now you can get greatly increased footage on concrete cutting jobs by specifying *new Felker DI-LOCK Segmented Diamond Blades!* Resulting from a totally new base alloy and manufacturing technique, *here is a vastly improved blade having a solid dense metallic bond that literally coats every diamond particle with a new alloy!* Each diamond is securely gripped and held until life is completely exhausted! No microscopic voids; no gas pockets; no coarse, granular rim metal to weaken the grip on costly diamonds . . . *no fractured diamond particles* to reduce cutting speed or tear loose from the segments under high impact!

Proved on competitive tests to be the most outstanding development in diamond blades for concrete, *with footage increases from 26% to 70% over other standard blades tested on the same job!* Get the facts on Felker DI-LOCK today! Available from all Felker Distributors.

Remember, Felker means Footage!

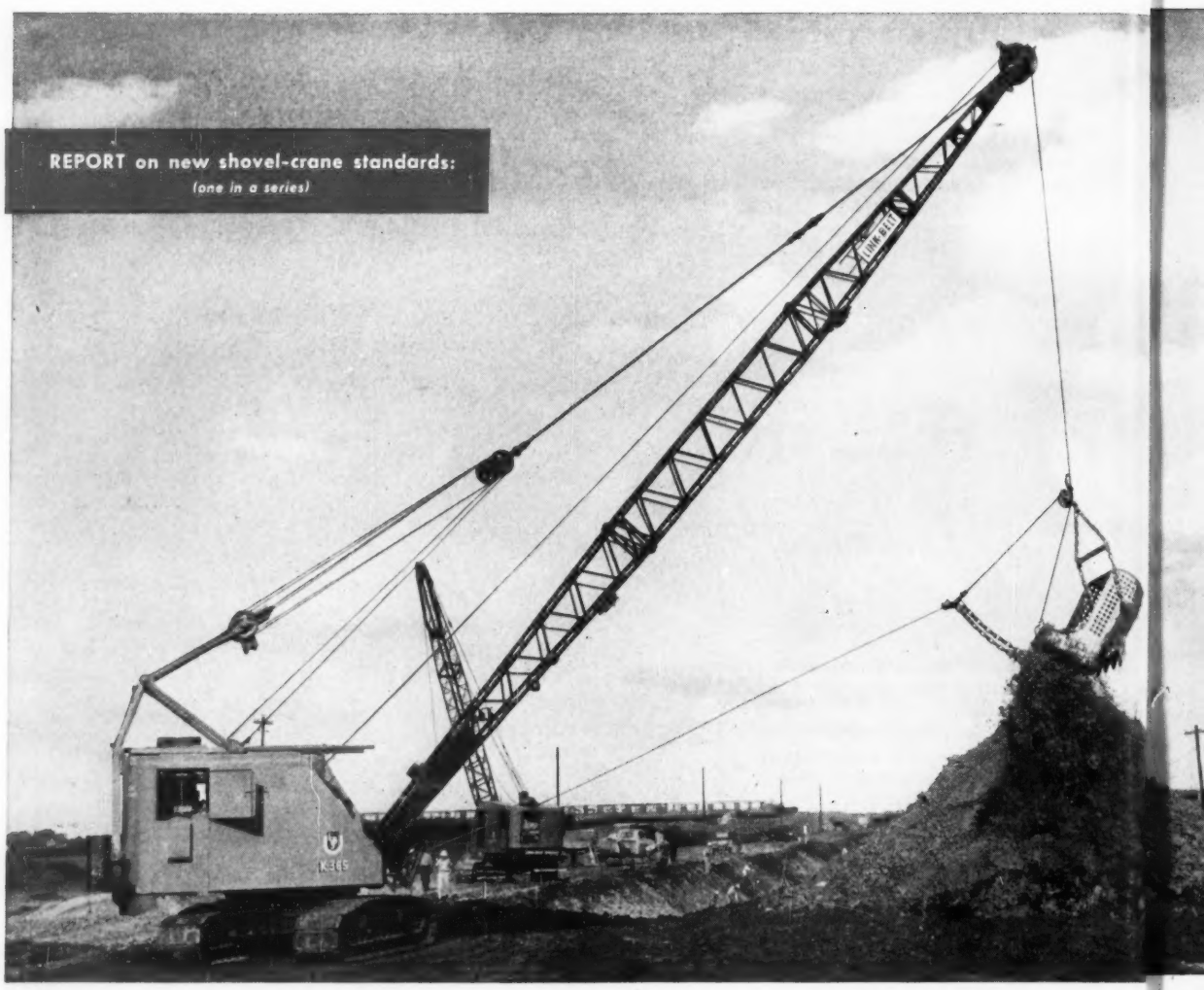
FEATURED IN BOOTHS 93 AND 94, A.E.D. CONDEX, CHICAGO, JAN. 27-'57

FELKER DI-MET SINCE 1924

FELKER MANUFACTURING CO.

Torrance, California

First in Diamond Cut-Off Blades!



Upping cycles per shift with

Standard on every Link-Belt Speeder, Speed-o-Matic fingertip controls minimize operator fatigue. Response is fast, positive, precise

Exclusive with Link-Belt Speeder, this true power hydraulic control system utilizes oil under pressure. An engine-driven pump supplies pressure to put the machine through its paces at the flick of the operator's wrist. Result—he's not subject to costly end-of-the-shift letdown... he stays fresh, works at high speed *all* shift.

Hydraulic-actuated clutches . . .

engage smoothly, surely . . . eliminate jerk, jump or lag. There's perfect feel of the load for high-speed with safety and accuracy. Self-compensating for heat and normal lining wear, the clutches eliminate frequent stops for clutch adjustments . . . convert downtime into productive time.

Advanced design throughout

When you put a Link-Belt Speeder on your job, you get a machine that's years ahead of the field . . . a machine tops in production profit, unusually low in maintenance and service costs. See how you, too, can set new high standards of shovel-crane performance, earn bigger return on your equipment investment. See or call your Link-Belt Speeder distributor for the complete story or write: Link-Belt Speeder Corporation, Cedar Rapids, Iowa. 14.323

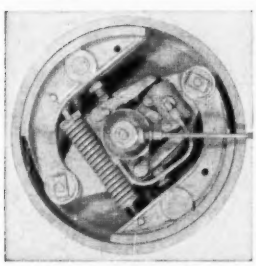
High-speed excavating

K-365 dragline with 1¾-yard bucket at left features exclusive Speed-o-Matic controls as standard equipment. System utilizes oil under pressure maintained by engine-driven pump through variable pressure valves, transmits pressure through oil directly to the hydraulic-actuated clutches. Engagement is smooth, precise. Operator has perfect feel of the load for effective work even though bucket is out of sight.

More usable horsepower

Size for size, Link-Belt Speeder shovel-cranes utilize more of the engines' available horsepower. This bonus pays off in added power at the bucket teeth, greater line pull plus extra power to swing, hoist and travel. Although it gets more usable power and line pull out of the same engines used in other shovel-cranes, a Link-Belt Speeder remains well within the engine manufacturers' recommended operating speeds.

power hydraulic controls



Self-compensating clutches

Hydraulic-actuated pistons automatically adjust for heat and normal lining wear. Hydraulic pressure is unaffected regardless of the distance the piston moves to engage clutch.

Adds an hour's output per shift! Independent-Swing-and-Travel, available on 11 models, eliminates shifting, saves 20-30 seconds each machine move. All operations are completely independent of each other.

SEE ALL THESE FEATURES AT THE ROAD SHOW—BOOTH 509

It's time to compare . . . with

LINK-BELT SPEEDER

Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls

Gulf products and fine service
keep equipment rolling
at seven million dollar shopping center

Oil is checked by Mr. Al Lugano, at right, and Mr. Edward Striffler, Gulf Sales Representative. This bulldozer has been operating on Gulfpride H. D. Select for more than 8700 trouble-free hours.

A quarter of a million cubic yards of earth will be moved in constructing the new Essex Green Shopping Plaza in West Orange, N. J. This seven million dollar shopping plaza, built on the site of an old golf course, will have 500,000 square feet of store area and parking space for 3500 cars.

Gulf products are used exclusively on this project by Lugano Brothers, Inc., of Belleville, N. J. In fact, Lugano Brothers have used nothing but Gulf products for 12 years . . . because they know they can always depend on Gulf for quality products, helpful petroleum engineering counsel and prompt delivery.

Fourteen hundred Gulf warehouses are at your service, too. Find out exactly how they can serve you. Write for your copy of "Gulf and *Your* Business."

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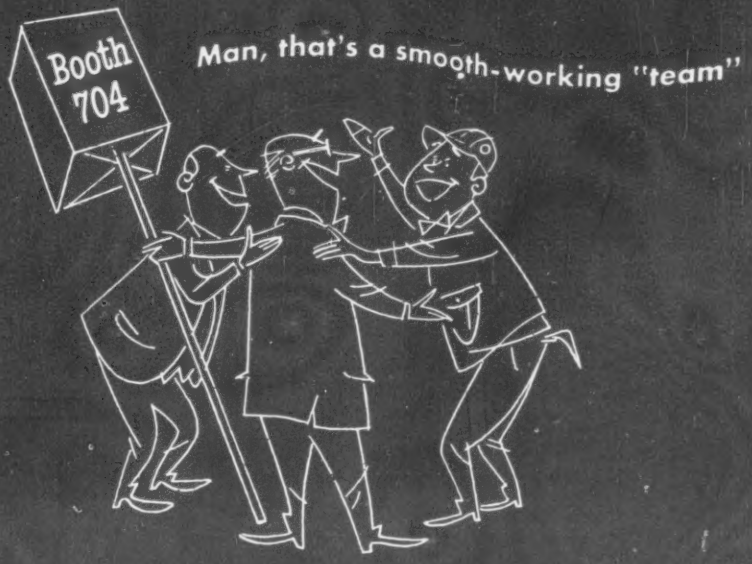
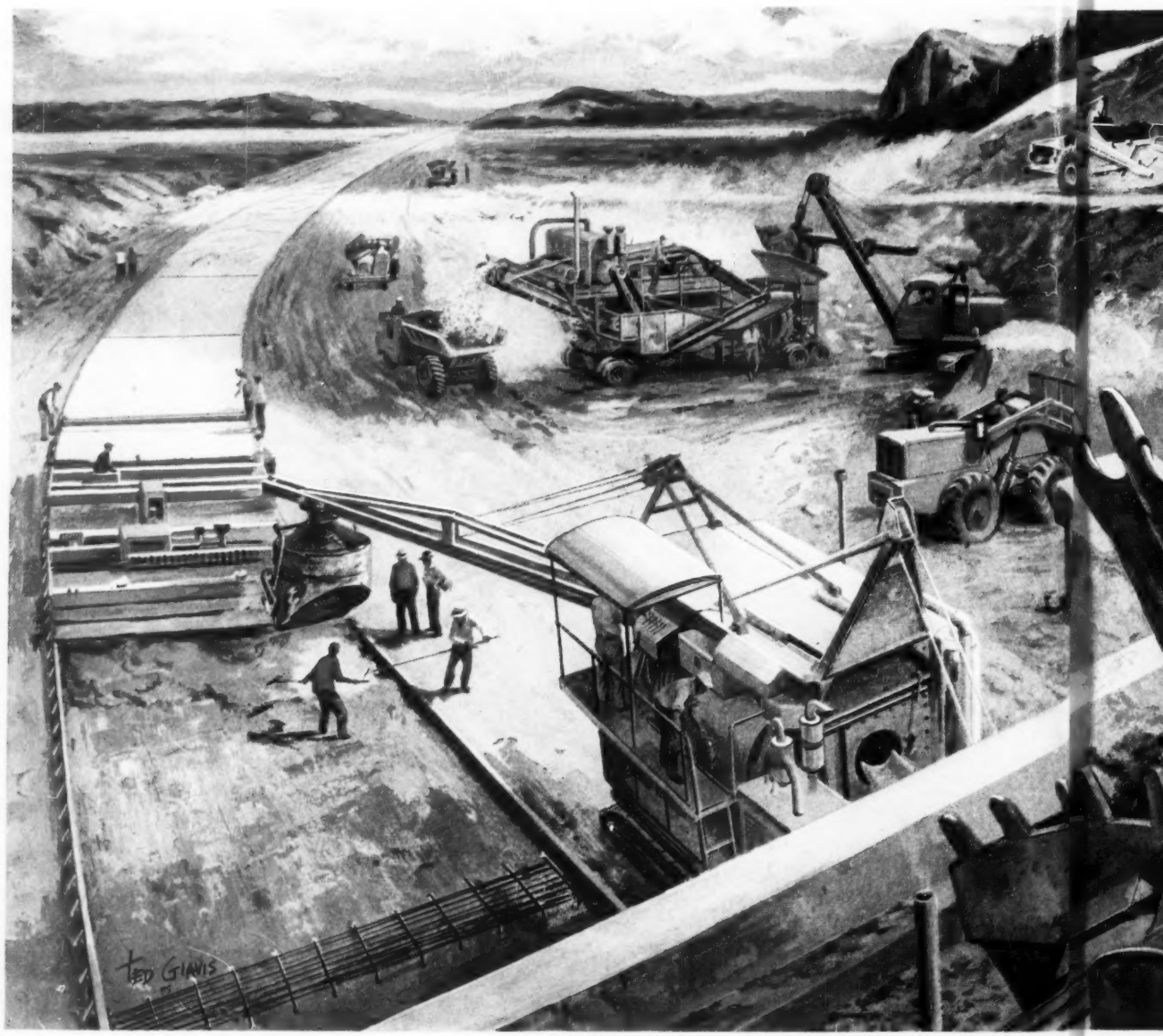
THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

You'll see the only combination Screw and Screed Spreader in the world...at Jaeger's Road Show exhibit



What's the most versatile Di



It's GM—Choice of more than 150 equipment builders

General Motors Detroit Diesel engines power more different types of road-building equipment—built by more manufacturers—than any other Diesel.

These versatile two-cycle engines drive compressors, crushers, drills, pavers, graders, shovels and the world's most powerful off-highway vehicles.

Leading manufacturers install GM Detroit Diesel power in more than 1000 different machinery applications because it gives their customers unequaled work output and dependability, plus the backing of a world-wide service organization.

Contractor experience has proved GM Detroit Diesel power more efficient than either gasoline engines or other Diesels on almost every kind of job from 30 H.P. up. And Detroit Diesel's new Turbopower engines deliver even higher efficiency *—up to 17% more power on the same fuel, or the same work with fuel savings up to 15%!*

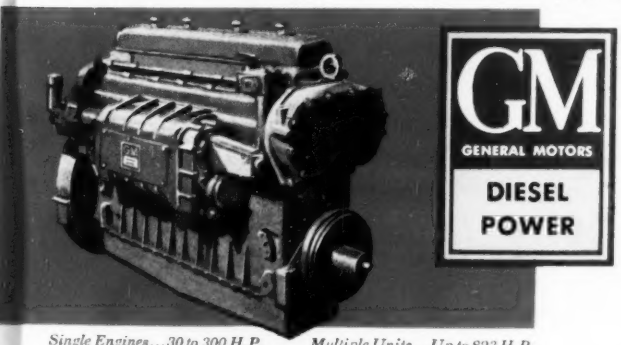
You're money ahead when you specify GM Detroit Diesel power in any equipment you build, buy or repower. It's America's First Choice Diesel *because it does more work at less cost!*

SEE OUR EXHIBIT AT THE ARBA ROAD SHOW, CHICAGO, JAN. 28 TO FEB. 2

Single E

Diesel in Road building ?

Equipment shown includes: Blaw-Knox MultiFoote paver and spreader; Koehring Dumptors; Cedarapids rock crusher; Link-Belt and Unit shovels; Ingersoll-Rand air compressor; LeTourneau-Westinghouse Tournapull and Pettibone Mulliken front-end loader. Write us for complete list of over 1000 GM Detroit Diesel power applications.



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GENERAL MOTORS
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Single Engines...30 to 300 H.P. *Multiple Units...Up to 893 H.P.*

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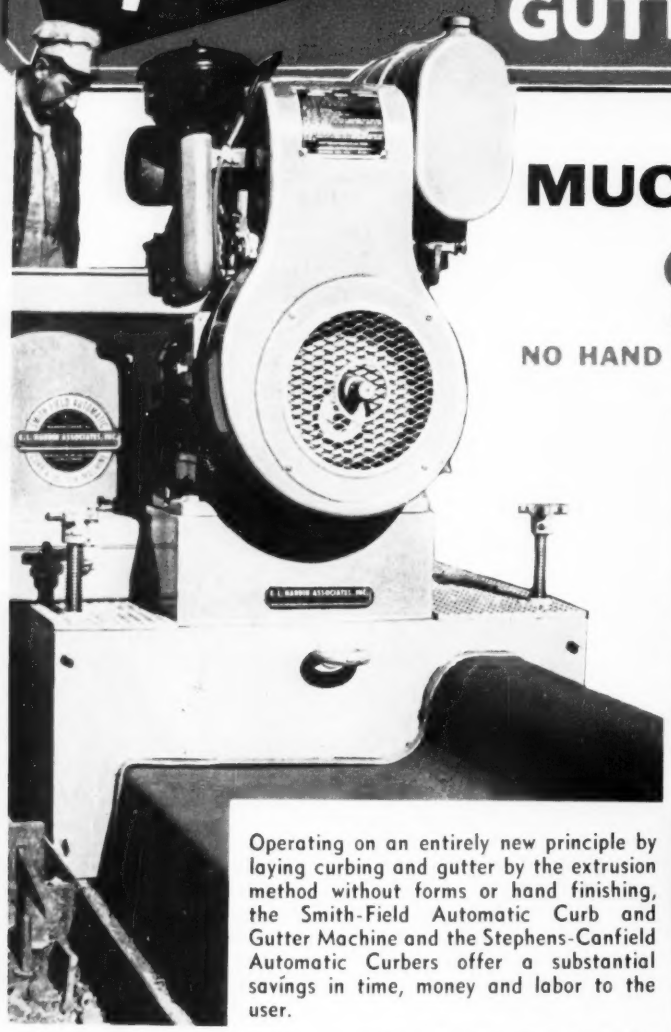
Faster BETTER CURB AND GUTTER LAYING at MUCH LESS COST

Save TIME, MONEY AND LABOR WITH THIS NEW METHOD

NO HAND FINISHING — NO FORMS



SMITH-FIELD AUTOMATIC CURB AND GUTTER MACHINE MODEL MARK 3

Operating on an entirely new principle by laying curbing and gutter by the extrusion method without forms or hand finishing, the Smith-Field Automatic Curb and Gutter Machine and the Stephens-Canfield Automatic Curbers offer a substantial savings in time, money and labor to the user.

Working equally well with either Asphaltic or Portland Cement concrete, the Smith-Field Automatic Curb and Gutter machine will lay up to 1,000 ft. of integral curb and gutter per day, under efficient methods and the Stephens-Canfield Automatic Curbers, up to 2,500 ft. per day.

Write for full details and prices

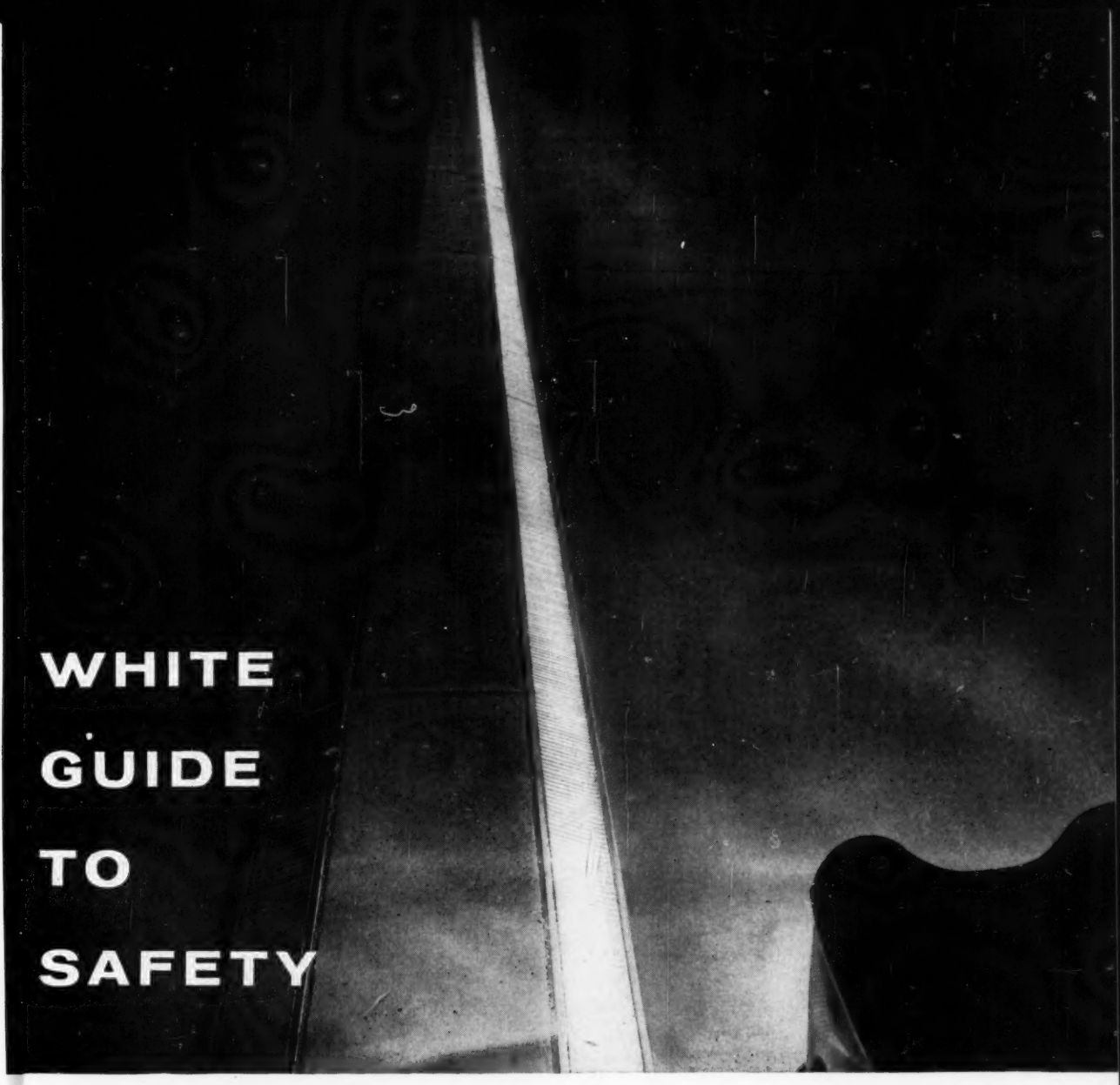
STEPHENS-CANFIELD AUTOMATIC OFFSET CURBER MODEL 56-W

STEPHENS-CANFIELD AUTOMATIC CURBER MODEL 55A

E. L. HARDIN ASSOCIATES, INC.

SALISBURY, NORTH CAROLINA U. S. A.

SOLE MANUFACTURERS AND DISTRIBUTORS—U.S.A. AND FOREIGN
PATENT NO. 2,707,422—AND OTHER PATENTS PENDING



. . . concrete reflecting curb made with Atlas® White Cement

Night driving is safer with this glistening strip of white concrete stretching ahead. Drivers can see every curve and slope far ahead of them, in ample time.

For day driving, white concrete curbs stand out in contrast to darker paving. At night, the curb's saw-tooth surfaces reflect headlight rays back to the driver. And on rainy nights, when the need for visibility is greatest, the wet curb surface becomes even more reflective.

White concrete reflecting curbs made of Atlas White Portland Cement are the choice of more and more highway designers and builders. No highway of today or tomorrow should be without them.

Write for further information on how Atlas White Cements are contributing to highway safety:
Universal Atlas, 100 Park Avenue, New York 17, N. Y.

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UNIVERSAL ATLAS CEMENT COMPANY—member of the industrial family that serves the nation—**UNITED STATES STEEL**

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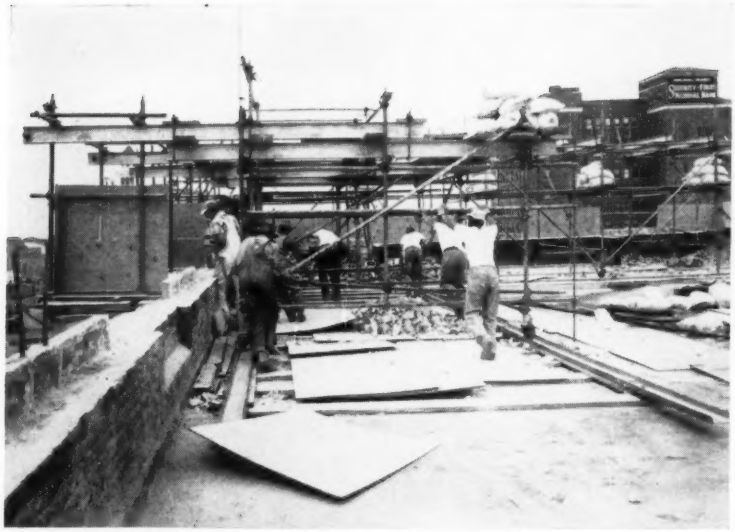
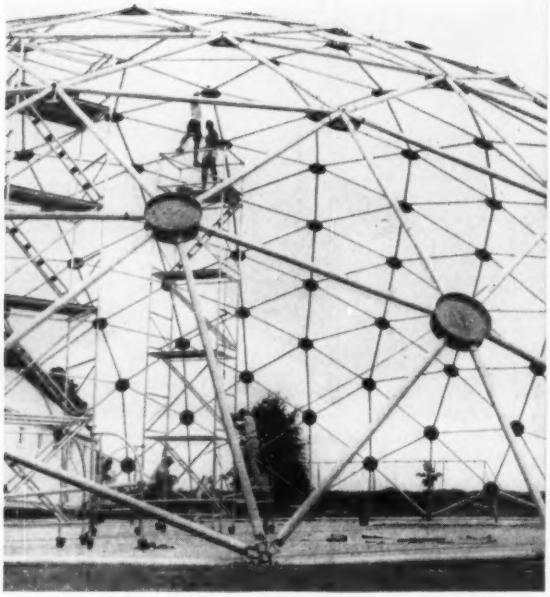
Scaffolding Methods . . .

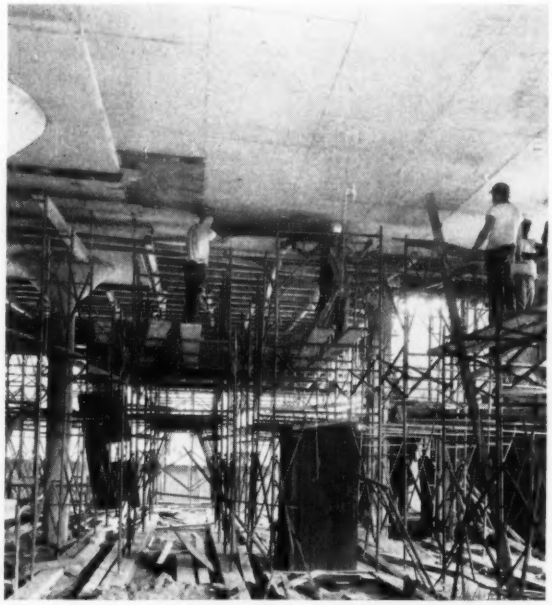
A Picture Report on Efficient Ways to Scaffold, and Shore Concrete . . . by Patent Scaffolding Co.



ROLLING CANTILEVER—Sam M. Duff, contractor, quickly removes cornice from Barker Brothers Building, Long Beach, Calif. from "TubeLox"® Scaffolding hung from cantilevered, rolling I-beam structures. Note channel tracks for easy movement and counterweight. This method, selected because permanent sidewalk canopy prevented use of built-up scaffolding, shows how a minimum amount of equipment can effectively perform the job.



"DOME" WORK FROM TOWERS—Working from 30′ Model B Aluminum Sectional Rolling Scaffolds and from the ground, men of Geodesics, Inc., erect this frame for a 100′ diameter dome in two days. Nylon tent attaches inside frame. Dome is for United States Industries Exhibits Pavilion, International Trade Fair, Kabul, Afghanistan.



"BUILT-IN" SCAFFOLDS—Stripping concrete forms is fast and simple when "Trouble Saver"® Sectional Steel Shoring is used to support slab construction. Workmen for Woerfel Corp., general contractor, get right up to the work on the same equipment used during pouring of new two-story, 120′ x 120′ City of Milwaukee 7th St. Storage Garage.

To help you with your scaffolding and concrete shoring methods, PS offers a complete nation-wide engineering service available to you locally. See the Yellow Pages in your 'phone directory for the nearest Patent Scaffolding office or representative that **sells** and **rents** "Gold Medal" Scaffolds.

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THE PATENT SCAFFOLDING CO., Inc.

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More than 100 basic engines, built to 2,000 different specifications, equip Continental with power plants tailored to the needs of construction machinery of practically all sizes and types.

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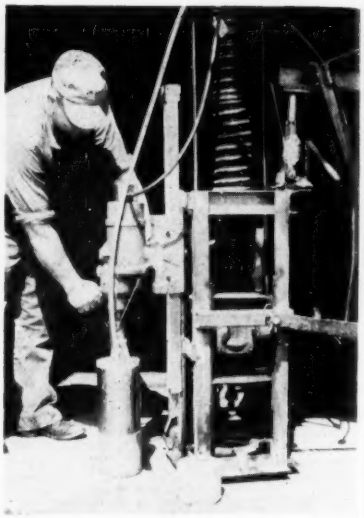
Job Talk . . .



Portable Diamond Drill Cuts 6-In. Dia Holes

A portable diamond drilling machine solved the problem of cutting 6 in. dia holes in reinforced concrete to repair anchorages in quonset huts used for grain storage.

When the sides began to pull away from the floor slab heavier bolts and straps had to be installed at the floor level.

The job called for the drilling of several hundred 6 in. dia holes 4 in. deep so that new anchors could be attached to the floor.

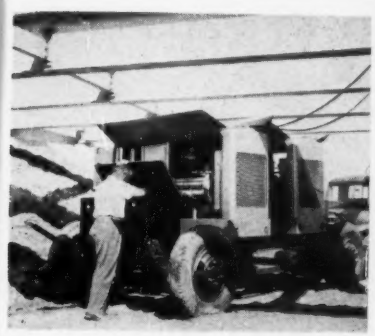
After several attempts, the contractor settled on a Truco portable diamond drilling machine. He mounted it on a rack attached to the rear of a rubber-tired tractor.

The drill took just 3 to 4 minutes drilling time per hole. Set-up time was from 4 to 5 minutes per hole. A maximum of 8 minutes was necessary for actual drilling and set-up time per hole. This allowed for the additional time required when the cores had to be knocked out.

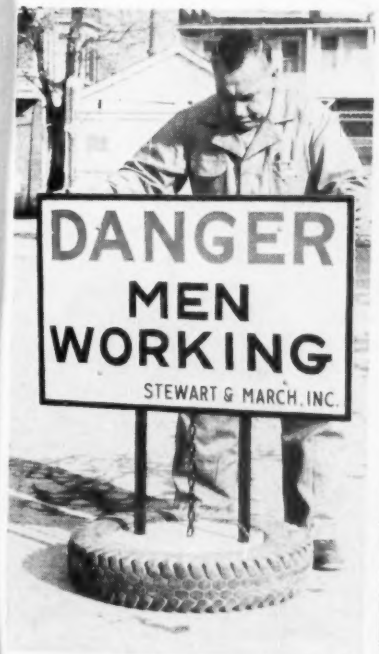
The diamond drill bits averaged 83 holes per bit before resetting. At this point, two of the three bits were still giving fair cutting action but were retired to assure maximum salvage of diamond for resetting. The job was completed in 64 working hours.

Mobile Welders Speed Bridge Decking

Twin 600-amp gasoline-driven Hobart welders mounted on a trail-



er proved an ideal power source for Montgomery Construction Company's stud-welding operations on Florida Turnpike bridges. They were quickly moved between the five bridges in Montgomery's contract, speeding the construction of the composite steel and concrete spans. Nelson headed shear connectors studs were installed five abreast, and about 12 in. apart, along the 50-ft beams. Forming crews followed closely behind.



Tires Make Simple, Portable Sign Base

A York, Pa., contractor has developed an easy, economical method of making effective road signs.

Continued on page 45

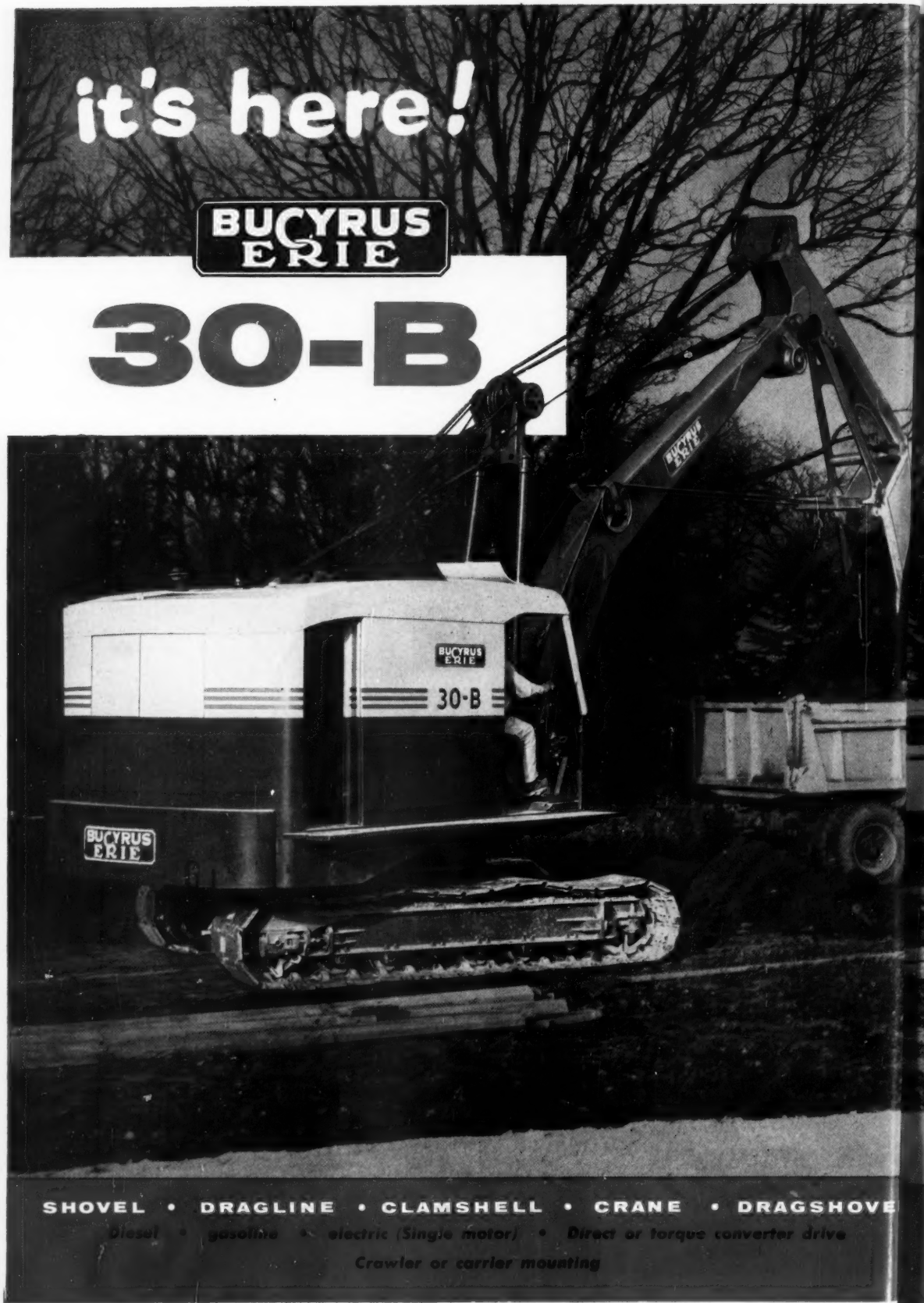
MORE Power...
BETTER Power...
for Every Phase of the
BIG ROAD PROGRAM!

Ten different series of gasoline models, spanning a wide power range, are completely interchangeable with companion series in the Cushioned Power* Diesel line, with which they have unusually wide interchangeability of parts.

SEE YOU AT THE ROAD SHOW
— BOOTH 329 —

Continental Motors Corporation
205 MARKET STREET • MUSKEGON, MICHIGAN

CONTINENTAL MOTORS
Powerful as the Nation
AMERICA'S STANDARD
*TM REG.


it's here!
BUCYRUS ERIE
30-B
BUCYRUS ERIE
30-B
BUCYRUS ERIE
SHOVEL • DRAGLINE • CLAMSHELL • CRANE • DRAGSHOVE
Diesel • gasoline • electric (Single motor) • Direct or torque converter drive
Crawler or carrier mounting

Here's a brand new 1-yd. profit-maker for you—the Bucyrus-Erie **30-B**. Offered with either crawler or rubber-tired carrier mounting, it's readily convertible to various front ends—shovel, dragshovel, dragline, crane, or clamshell.

New . . . fast . . . quality-built, the **30-B** is just what you need in a 1-yd. machine to put you in a good position in the busy construction season ahead! Check the brief rundown of features given below; then request full details.

SEE IT AT THE ROAD SHOW!

Arena—space No. 514, corner 5th Avenue & U.S. 66

Matched to your needs

Either direct drive or torque converter drive—whichever best fills your requirements.

Five front ends, easily converted—main machinery arrangement simplifies conversion to shovel, dragshovel, crane, dragline, and clamshell to fit the job.

Your choice of five crawler mountings—standard length frames with either standard width or narrow width treads; long frames with narrow, standard, or wide treads; plus Transit Crane on rubber-tired carrier.

Extra equipment for special jobs—independent propel, third drum unit, cathead, telescoping boom stops, and various-length crane booms and jib extension.

Designed to out-perform

Easy, air control—hoist, crowd or drag, swing or propel, and steering clutches, as well as digging and swing brakes and dipper trip, are air controlled. Controls are accurate, conveniently placed, easy to operate.

Minimum time for servicing—easy access for maintenance, automatic lubrication of many parts; special system, with remote control located at operator's position, for greasing swing pinion and rack; grease fittings grouped to save time; adjustments quickly made, infrequently needed.

Strong, simple construction—parts are large, simple, few in number; provide strength needed for effective working, keep the machine on the job.

Built to outlast

Six conical hook rollers—two equalized pairs in front, two single in rear distribute loads evenly between upper and lower works, save wear.

Large, cool-running clutches and brakes—assure longer life. Five main operating clutches are alike, with parts interchangeable.

Specially processed steels add strength and wear resistance. Care in manufacturing pays off in extra years of machine life.

Strong, rigid cast steel revolving frame—built to withstand twisting and bending stresses—provides firm base for main machinery, maintains alignment to minimize wear.

THERE'S MORE—MUCH MORE ABOUT THE BUCYRUS-ERIE 30-B.

To get the full story, send the coupon in today or see your Bucyrus-Erie distributor. He has all the facts—will be glad to explain the 30-B's many outstanding features.

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

send for complete facts

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Gentlemen: Please send me details on the new 30-B.

Name _____

Organization _____

Address _____

City _____ State _____

198E56C

ALL NEW DESIGN!

Simple...Foolproof...Low Cost

1500 WATT HOMELITE GENERATOR

Model 35A115
Homelite Generator
1500 Watts, 115 Volt
60 Cycle AC

WEIGHS ONLY 90 LBS.

As easy to move as an electric hand saw!

1. New Money-Saving features . . . No DC brushes; just two easy-to-get-at collector ring brushes . . . No commutator or DC windings . . . No intermediate couplings; armature keys directly to shaft. Fewer parts to wear out — longer trouble-free generator service.

2. Constant Voltage . . . less than 4% change from no load to full 1500 watt capacity . . . assures long service life for your electric tools . . . guarantees top performance at all times.

3. Overload Capacity . . . 1500 watt continuous duty with generous overload capacity prevents tool stalling under heavy loads . . . insures uninterrupted service even when starting loads exceed operating loads.

4. Compact and Lightweight . . . one man can easily carry this generator wherever you need electricity to power time-saving electric tools. No need for long, hazardous power-consuming cables.

Whatever tools you want to operate — electric saws, drills, floodlights, grinders, belt sanders, hammers, — the new Homelite 35A115 generator can save you money. For a free demonstration or additional information, call your nearest Homelite representative, or write:

SAVE EVEN MORE! New Homelite electronic idle control unit, available as optional accessory, runs engine at idle speed when no current is drawn . . . automatically brings engine to full speed when load is applied.
Ask your Homelite representative to show you how this easily-installed accessory reduces engine wear . . . increases service life . . . cuts fuel consumption.

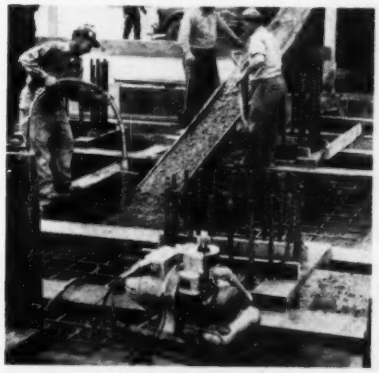
See our Booth at the Road Show

HOMELITE
A DIVISION OF TEXTRON, INC.
RIVERDALE AVE., PORT CHESTER, N. Y.
Manufacturers of Carryable PUMPS • GENERATORS • BLOWERS • CHAIN SAWS

Full Line of Carryable Construction Equipment Now Offered by Homelite

Carryable Diaphragm Pump . . . This self-priming, 120 pound diaphragm pump will handle water in the thickest sand, muck, or mud. Capacity: 5,000 g.p.h. Size: 3". Complete line of centrifugal pumps are also available in sizes from 1½" to 3".

Chain Saws For Every Job . . . Now you can choose from a full line of lightweight, powerful Homelite chain saws. From 3½ to 7 horsepower . . . 19 to 29 pounds. Brush cutting and clearing attachments are available to handle all your cutting jobs.



One-Man Electric Vibrator . . . It takes only one man to place concrete with powerful, Homelite high-cycle or universal electric concrete vibrators. Carryable Homelite generator provides power for high-cycle vibrators *and* 110 volt DC for all universal vibrators, tools and floodlights.

HOMELITE

a division of Textron Inc.

PORT CHESTER, NEW YORK

JOB TALK . . .
continued from page 41

Stewart and March, Inc., build their own signs and mount them in concrete-filled rubber-tire bases. They are portable, easy to erect, and, because they are slipped together rather than nailed, have a long life.

Inside an old 6:00x16 tire, the contractor places two 4-in. lengths of 1½-in. pipe held 14 in. apart by two pieces of ⅜-in. steel rod. These rods also serve to reinforce concrete which is poured inside the tire and around the pipe sleeves. A circular piece of 1-in. plywood holds the tire rims off the floor during the pour. Also embedded in the concrete is a steel ring, into which a chain is pad-locked to anchor the sign to the base.

All signs are plywood, attached to a pipe frame which fits into all bases. Cross members of the frame are ¾-in. angles attached with ¼-in. x 2-in. brass bolts.

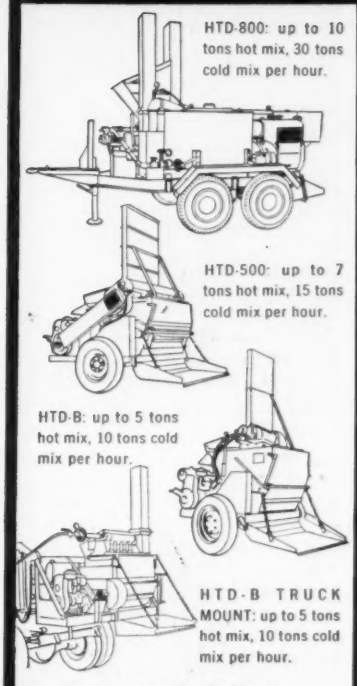
Special Trenchers Dig Drainage Canals

Two specially equipped trenchers are helping to construct 1,000 mi of irrigation trench in the huge Greater Mussiab land reclamation project in Iraq.

Excavating begins with the removal of a 20-ft wide strip of topsoil to a depth of 20 to 40 in. This is done with an elevating grader making from 10 to 12 passes over the strip. A Cleveland 320 trencher then moves in and cuts a huge side-sloped trench 20 ft wide at top, 8 ft deep, and 40 in. wide at the bottom. Some minor canals are 16 ft wide at the top, 6 ft deep, and 40 in. wide at the bottom. Trenchers cut these canals through hard clay, using sloper blades, double conveyors, and flingers. On both sides of the canals, they distribute spoil in thin layers, forming access roads.

For Low Cost Paving or Patching

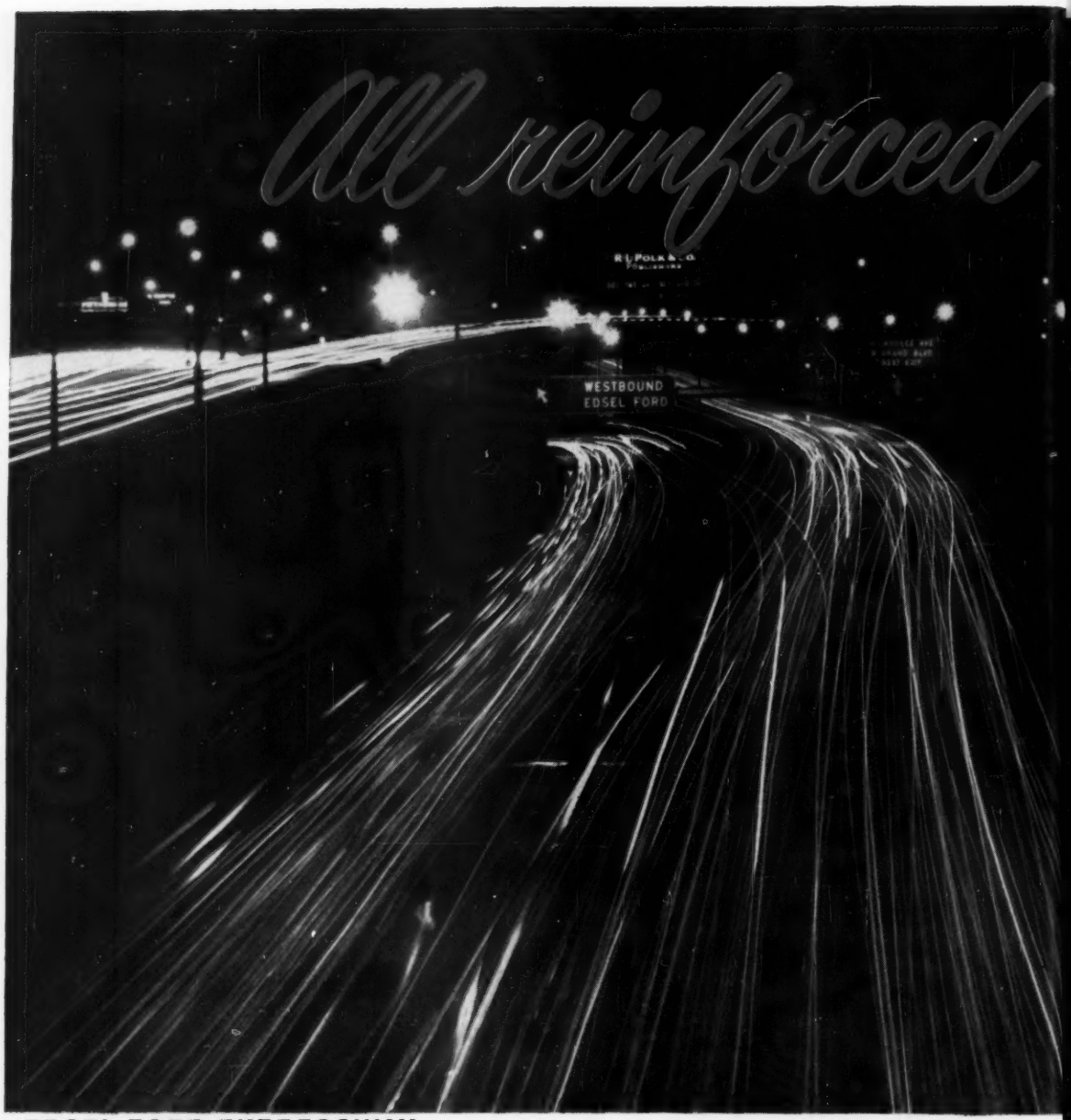
McConnaughay ASPHALT MIXERS


HTD-800: up to 10 tons hot mix, 30 tons cold mix per hour.
HTD-500: up to 7 tons hot mix, 15 tons cold mix per hour.
HTD-B: up to 5 tons hot mix, 10 tons cold mix per hour.
HTD-B TRUCK MOUNT: up to 5 tons hot mix, 10 tons cold mix per hour.

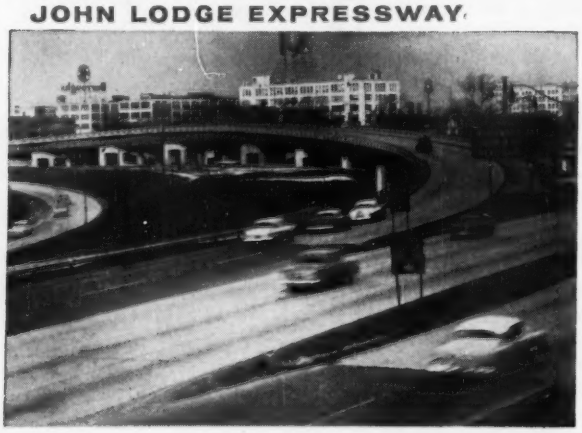
For details and specifications, write, wire or 'phone . .

K. E. McCONNAUGHAY
LAFAYETTE, INDIANA

National distributors: Asphalt Equipment Co., Inc., 3314 Cherry Lane, Fort Wayne, Indiana



EDSEL FORD EXPRESSWAY
JOHN LODGE EXPRESSWAY



PENNSYLVANIA TURNPIKE

OHIO TURNPIKE

AMERICAN WELDED WIRE FABRIC

EASY TO INSTALL. American Welded Wire Fabric comes in prefabricated sheets that can be placed quickly with minimum crews. It stays in place during pouring.

LOW COST. American Welded Wire Fabric has high-strength steel wire, electrically welded together for positive anchorage. The concrete slab is effectively reinforced with less steel than other types of reinforcement; so you have less steel to buy and less to handle. American Welded Wire Fabric keeps down maintenance costs, too, because it prevents destructive cracking, keeps roads smooth and safe.

VERSATILE. American Welded Wire Fabric comes in wide sheets for continuously reinforced concrete pavements in wire sizes up to and including ½" in diameter, at 2", 3", 4", and 6" on centers. The use of American Welded Wire Fabric increases the strength of the concrete slab by 30% over that of non-reinforced concrete.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL
GENERAL OFFICES: CLEVELAND, OHIO

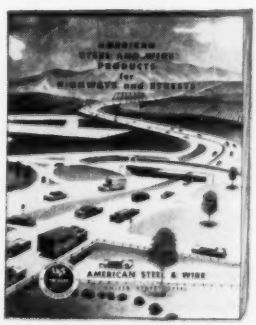
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Every type of reinforced concrete construction needs

USS American Welded Wire Fabric

UNITED STATES STEEL

FREE CATALOG



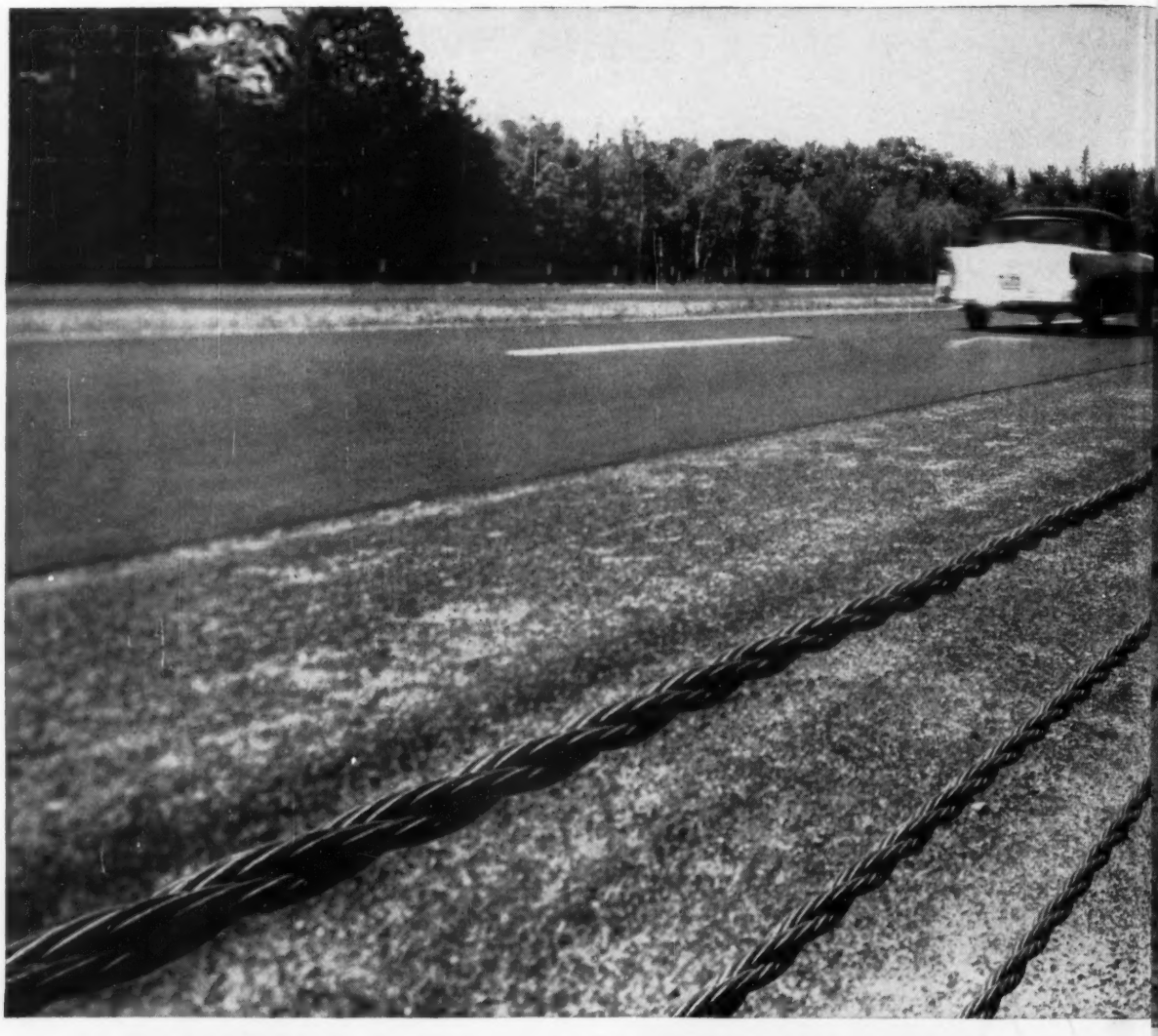
American Products for Highways and Streets

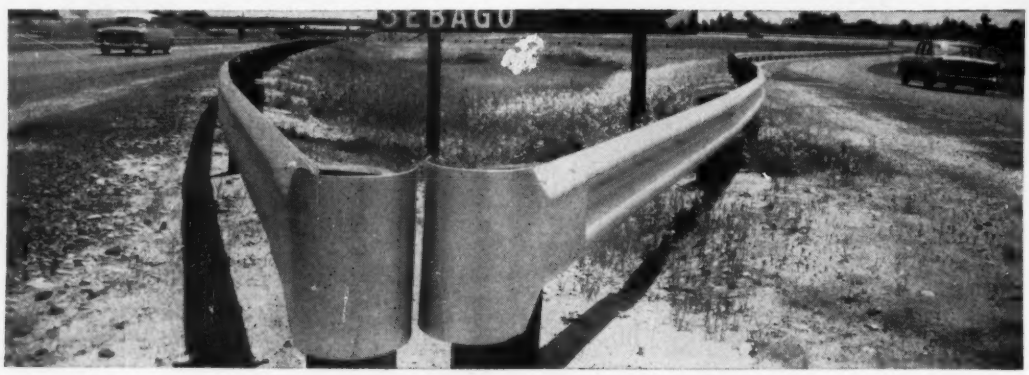
Here's a brand-new catalog describing the entire American line of products for highway and street construction. Includes application photographs and helpful information about each of these products. Send for your copy of this informative catalog today. Use the check box coupon at the end of this 8-page unit. It's free!

On New Maine Turnpike

Two types of

COMBINE SAFETY WITH





# of American Highway Guard

TH GOOD APPEARANCE

▲ American Multisafty Cable Highway Guard, like this used on the new Maine Turnpike, provides two-fold protection. First, it restrains cars from piummeting off the berm. Second, the combination of resilient steel cable and resilient spring-steel offset brackets cushions the shock of collision and helps minimize damage to the vehicle, serious injury to the passengers.

◀ American Beam-Type Highway Guard is also used on parts of the Maine Turnpike. It provides a strong, attractive, durable guard.

THE MEN who designed the Maine Turnpike needed two types of highway guard. Along some sections they wanted to use cable guard; at other sections, they wanted beam-type guard. They obtained *both* types from American Steel & Wire. American Multisafty Highway Cable Guard and American Beam-type Highway Guard assure an economical installation that will stay attractive *and* protective with minimum maintenance. With these two guards they combined essential safety with desirable good looks.

American Multisafty Cable Guard comes in two basic types: 3-cable guard, which gives adequate protection at highway speeds up to about 50 miles per hour; and 4-cable highway guard, which protects up to about 75 miles per hour. A Super Guard consists of six or eight cables for special situations, where an extraordinary margin of safety is desired. In any installation, cables can be added or replaced quickly and easily if changing highway conditions demand additional protection.

Remember the quality and the reputation of American Steel & Wire when you need construction materials of any type of highway guard, wire fabric, road joints, or wire or strand for prestressed concrete. Send the coupon for complete information about any of these products.

AMERICAN STEEL & WIRE DIVISION
United States Steel, General Offices: Cleveland, Ohio
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

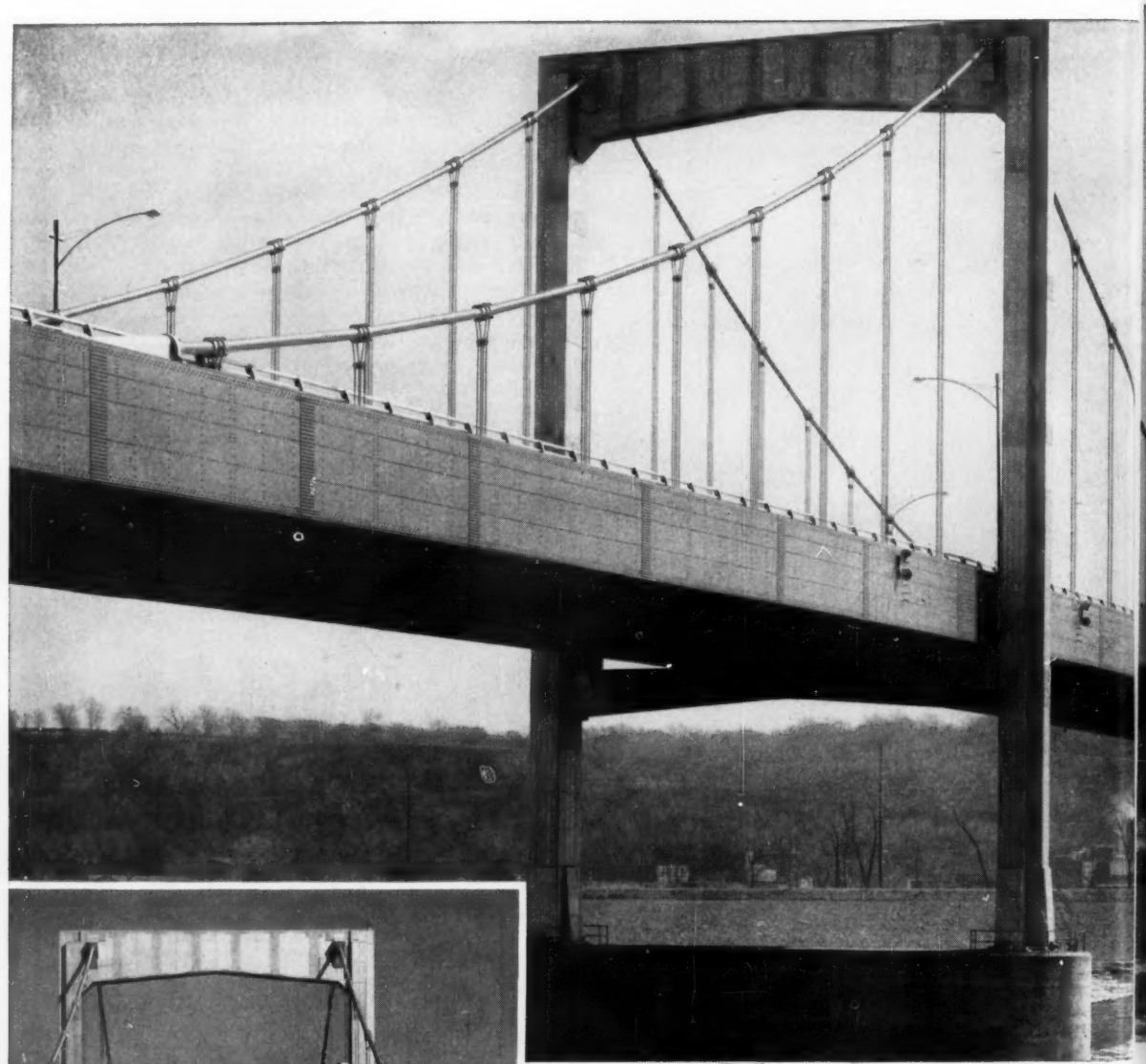
USS Multisafty Highway Guard

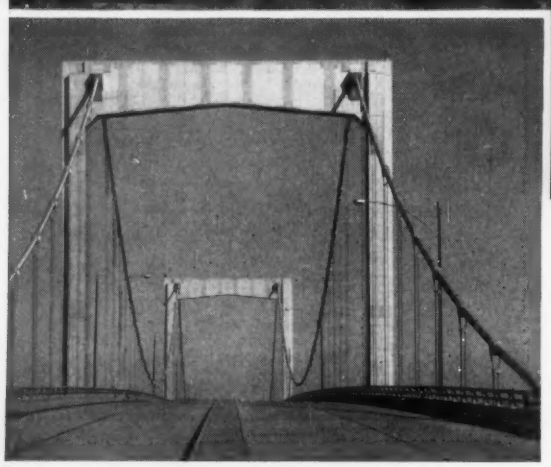
USS UNITED STATES STEEL

How many products does United States Steel manufacture for road builders?

Have any idea? Know what they are and how they can strengthen and protect your roads? The ads in this 8-page unit describe some of them, but there are many more. You can learn all about the entire line of USS Road Building Products at the ARBA Road Show. Be sure to visit the United States Steel exhibit. You'll see an animated display showing how and where these quality products are put to work in the step-by-step construction of a model highway. Don't miss it! The United States Steel Exhibit at the ARBA Road Show, International Amphitheater in Chicago, Jan. 28 through Feb. 2.

Longest **self-anchored** suspension built with American Tiger Brand





The main cables and suspender cables were engineered and fabricated by American Steel & Wire Division. The main cables are built up of 37 strands each for a total of approximately 94,350 feet of Tiger Brand Galvanized Bridge Strand.

bridge in the United States

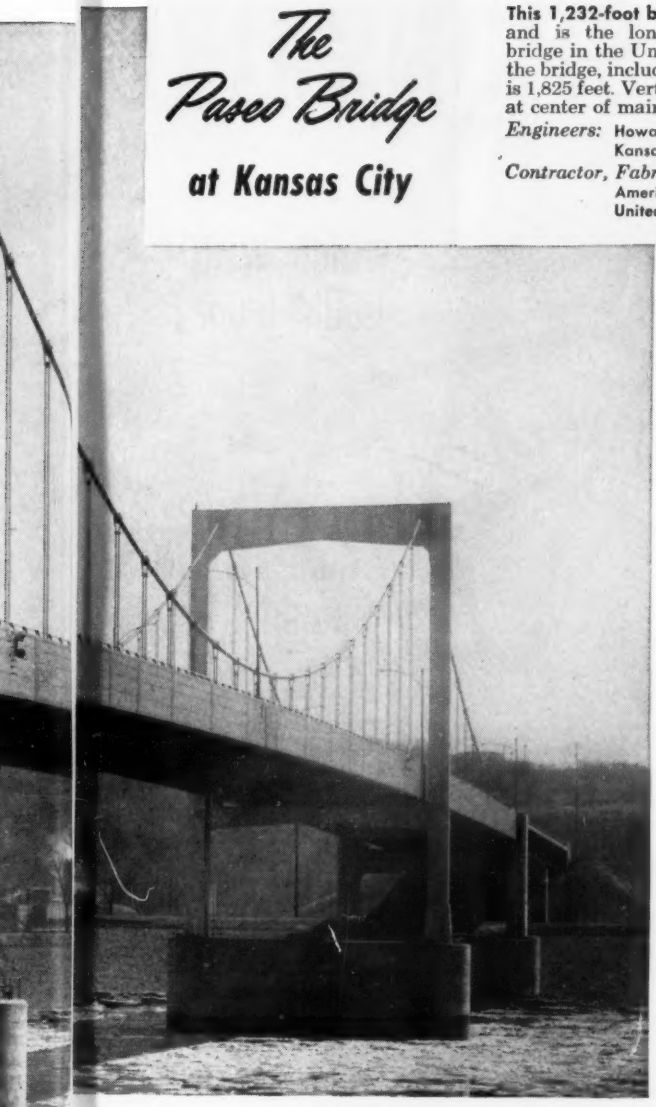
Pre-stressed Bridge Strand

The Paseo Bridge at Kansas City

This 1,232-foot bridge spans the Missouri River and is the longest self-anchored suspension bridge in the United States. The total length of the bridge, including two deck plate girder spans is 1,825 feet. Vertical clearance above high water at center of main span is 55 feet.

Engineers: Howard, Needles, Tammen & Bergendoff, Kansas City, Mo.

Contractor, Fabricator and Erector: American Bridge Division, United States Steel Corporation.



THE PASEO BRIDGE over the Missouri River at Kansas City, Missouri, is unique by comparison with other suspension bridges because it is self-anchored. That is, the stiffening girders themselves are designed and utilized to resist the tension of the main cables, instead of having huge anchorages at each end to resist this force.

This bridge has a 616-foot main span and two 308-foot side spans. Main cables are 12 inches in diameter and are built up of 37 strands—31 strands $1\frac{13}{16}$-inch diameter plus 6 strands $1\frac{1}{4}$-inch diameter. The cables are approximately 1,275 feet long and have a total combined strength of 27,500,000 lbs. To complete the main cables, galvanized soft steel wire is spirally wrapped around the combined strands to protect the cable and provide a smooth surface for painting.

Before shipping, the strands were pre-stressed to one half of their designed breaking strength for several hours. This is not only a thorough test of the quality of the material, but also produces a cable strand that will not stretch over the years due to use.

The stiffening girders carrying two 26-foot roadways are suspended from the main cables by 90 $1\frac{1}{2}$-inch diameter galvanized suspender ropes each having a breaking strength of 104 tons. They were also pre-stressed and fabricated to exact dimensions to fit their places in the structure without further work or adjustment.

American Steel and Wire Division is eminently fitted to handle important jobs like this. It has the engineering experience and complete manufacturing facilities to produce the finest bridge strand you can buy. Call or write for further information.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN TIGER BRAND WIRE ROPE

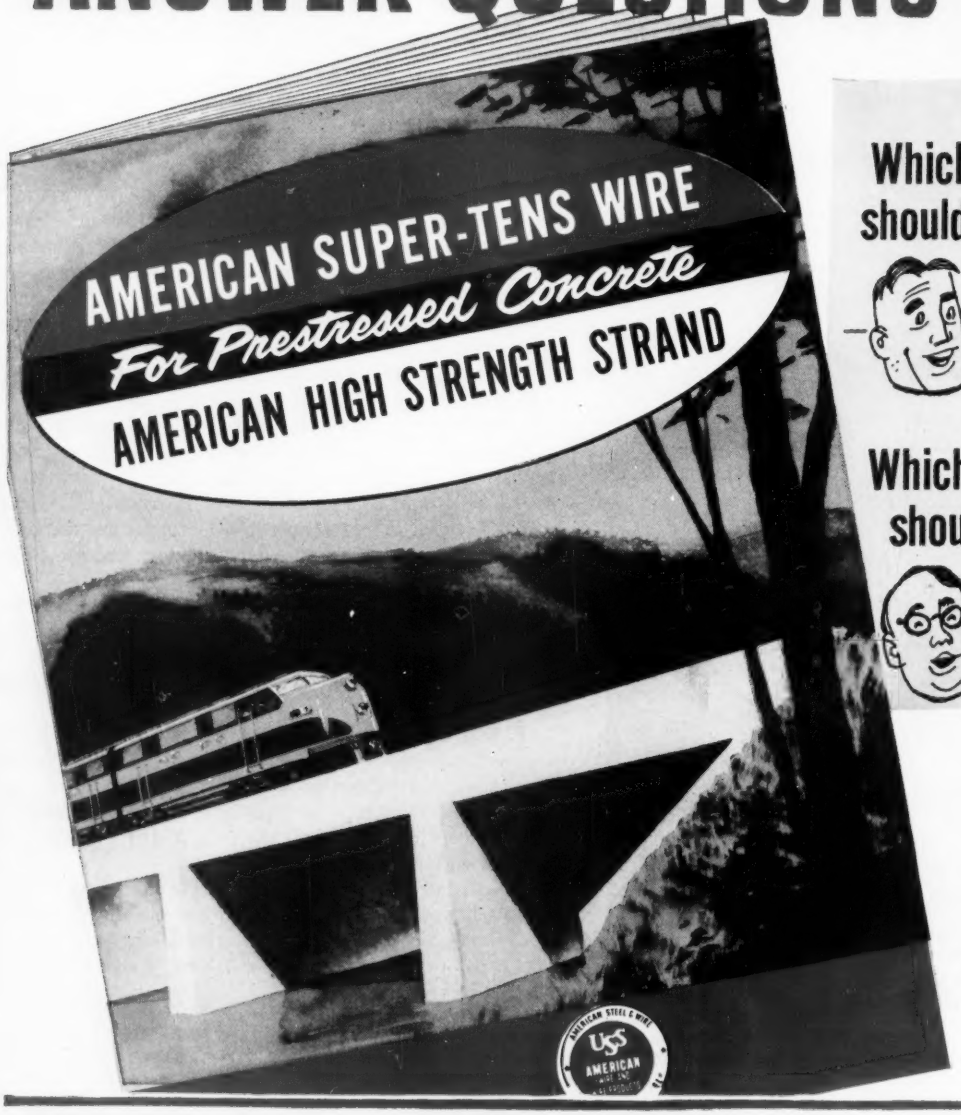
Excellay Preformed

USS

UNITED STATES STEEL

If you're using prestressed concrete...

THIS NEW BOOKLET ANSWER QUESTIONS LIKE



Which WIRE should I use?

Which FITTINGS should I use?

USS AMERICAN *Super-Tens* WIRE & HIGH

HELPS THESE

SEND THIS COUPON FOR A FREE COPY. This new 16-page booklet describes the complete line of high strength wire, high strength stress-relieved strand, and end fittings manufactured by American Steel & Wire. It contains stress-strain curves, typical tensioning loads and breaking strengths for American Super-Tens Wire and American High Strength Strand—quality products that are especially made for use in prestressed concrete. Send for your copy.

AMERICAN STEEL & WIRE DIVISION

United States Steel, General Offices: Cleveland, Ohio
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

American Steel & Wire
Rockefeller Building
Cleveland 13, Ohio

Please send your descriptive booklets and information on the following:

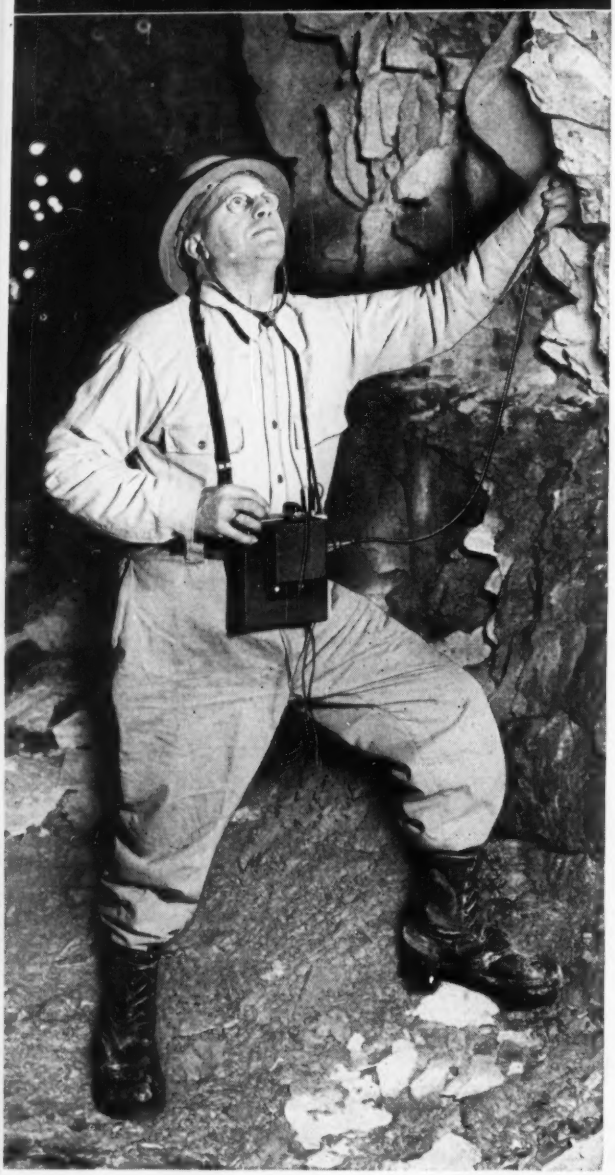
- ☐ American Super-Tens Wire and American High Strength Strand
- ☐ American Products for Highways and Streets Catalog
- ☐ American Road Joints
- ☐ American Welded Wire Fabric for Portland Cement Concrete
- ☐ American Welded Wire Fabric for Airport Runways
- ☐ American Welded Wire Fabric for Asphaltic Concrete
- ☐ American Multisafty Highway Cable Guard
- ☐ American Beam-Type Highway Guard

Name .....
Firm .....
Address .....
City ..... State .....

STRENGTH STRAND

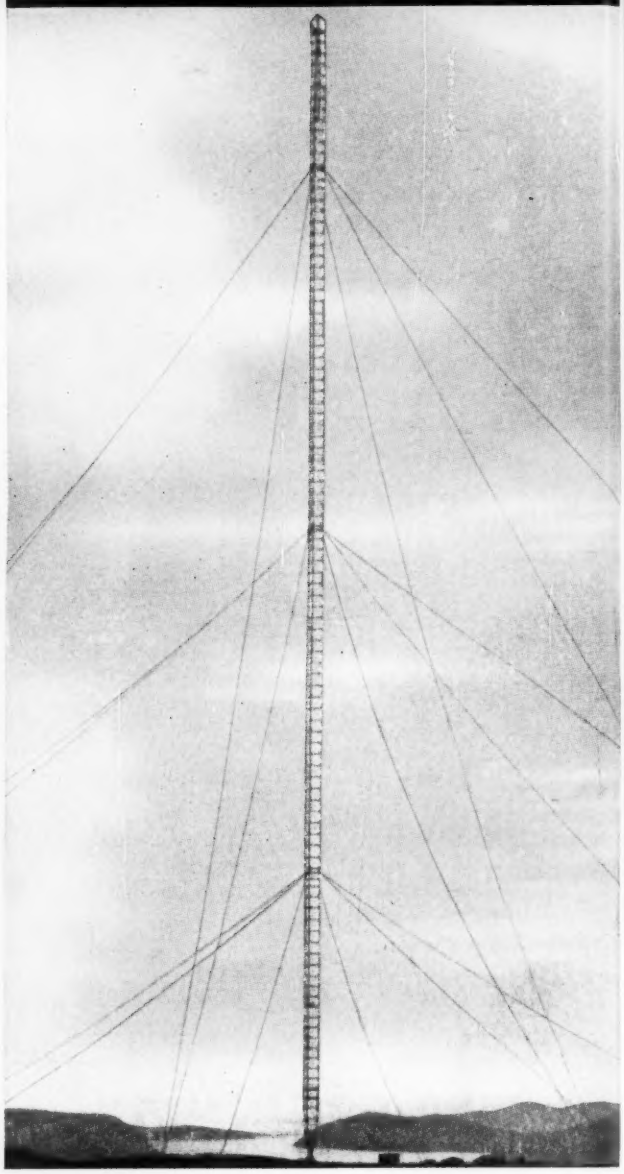
UNITED STATES STEEL

A TUNNEL..



THE TUNNEL: A Liberty Mutual policyholder had a contract to build a twenty-seven mile aqueduct through the Catskill Mountains. The tunnel on this project involved two intermediate shafts, and the outlet portal that had seven headings, in operation twenty-four hours a day, five days a week. To service this job, Liberty Mutual opened an office in a nearby community. On-the-spot experienced Loss Prevention Engineering, claimsmen on the job site and the full cooperation of the contractor, resulted in the return to the contractor of more than $700,000 as retrospective premium savings.

A TOWER..



THE TOWER: One of the toughest jobs in the Thule project was the erection of a 1206-foot tower. Despite hazardous conditions in Arctic gales, only one minor accident resulted on this intricate but small part of the job. Liberty engineers watched over the safety of the thousands of construction workers on the whole Thule project. The accident record there was 75% better than the U. S. record for construction companies. Liberty's engineering approach to accident prevention and the cooperation of the contractors reduced losses. The final insurance cost for the project was millions of dollars less than expected.

For 20 straight years — the nation's largest writer of Workmen's Compensation Insurance

A THRUWAY

Three jobs that prove it pays to insure with Liberty Mutual no matter what you build, no matter where you build

THE THRUWAY: Liberty insured 64% of the mileage on the New York Thruway. The contractors worked with Liberty to put safety first. As a result of the excellent loss record, dividends and retrospective premium returns approximated a *million dollars*. Before work began, Liberty analyzed potential hazards, then kept on top of problems through local offices. Liberty engineers were always on hand and, when accidents occurred, Liberty claimsmen were on the spot to provide service. Loss Prevention Engineering has helped make Liberty Mutual the leader in compensation insurance.

LIBERTY MUTUAL

The Company that stands by you

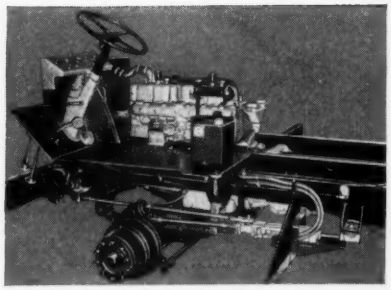
Liberty Mutual Insurance Company • Liberty Mutual Fire Insurance Company • Home Office: Boston.

HERE'S WHY CONTRACTORS GET MORE WORK DONE FAST...

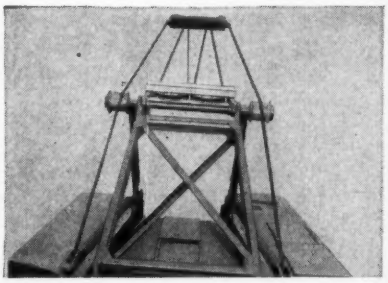
with the BAY CITY CRANEMOBILE

The drawing, above, illustrates the fact that you can raise or lower the boom on a BAY CITY CraneMobile—always under power. Independent boom hoist keeps boom under control at all times with variable speeds in raising or lowering boom or boom and load. An automatic brake safely holds boom in position without drifting.

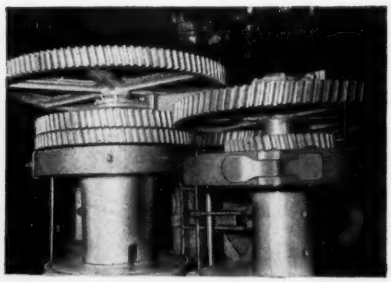
Operating photograph, right, shows a 25-ton BAY CITY CraneMobile safely and quickly setting the 2½ ton top section of a stack in place 130 feet up. This operation was done by the Towne Construction Company in Canton, Ohio. No outside help is needed to lift the 140 foot boom and jib.



Modern Power Steering for safe, sure control of CraneMobile on the road and quicker maneuvering into position on the job. Also standard are the six-wheel air-brakes.



Hi-gantry, floating bridle and boom back-stops give positive control of long or short booms in every operating position. Gantry collapses within recessed cab-roof to reduce overall clearance when traveling.

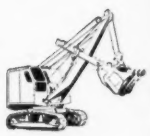


Power load-lowering device, consisting of idler gearing between drums, permits controlled lowering of loads against engine compression without braking. Adequate power at all times is assured by high-torque, high compression, high H.P., low R.P.M. power plant.

BAY CITY SHOVELS, INC. • BAY CITY, MICHIGAN

BAY CITY

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS



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JAEGER SHOWS ALL...new model Rotary Compressors and Pumps, Bridge Builders' Mixers and the big news in Truck Mixers ...all at the Road Show

THESE '57 CHEVIES TURNED THE TOUGH ALCAN HIGHWAY INTO A TURNPIKE!

They took the "teeth" out of North America's toughest truck run in an amazing display of stamina and dependability! The Chevrolet Alcan test called for great truck components . . . and here they are, the same modern features you'll get in *your* '57 Chevy!

Modern high-compression 6's—a time-proved Chevrolet truck Thriftmaster 6 made the tortuous Alcan Highway test look easy . . . registered a high 18.17 miles per gallon!

Short-stroke V8 power—with the shortest stroke of any truck V8's, new Chevy engines stand first in their field for efficient load-pulling! Their great performance in Alaska proved it.

Safe, sure brakes now Alcan proved—in light- and medium-duty models, Hydrovac power brakes* supplied up to 85% of the braking effort!

Unit-design cab and body construction—Chevrolet truck cabs and bodies remained tight and solid on Alcan bumps, showed that they're built to *last!*

Rugged Synchro-Mesh manual transmissions—they displayed never-say-die durability . . . came through with smooth, flexible, trouble-free performance!

*Easy-going Hydra-Matic transmission**—it reduced driver's work immeasurably and it saved wear on drive-line parts, too!

Sturdy frames and long-leaf springs—these brawny chassis components proved they can take it when the going is roughest . . . took the Alcan's worst with strength to spare!

These Alcan-proved Task-Force 57 features and others like them (such as extra-heavy rear axles, easy-rolling Ball-Gear steering, and new, improved tubeless tires) are ready to tame your tough truck runs too! Boost your hauling profits by seeing your Chevrolet dealer soon! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

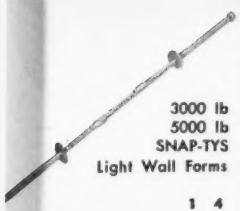
**Optional at extra cost.*

1957 CHEVROLET TASK·FORCE TRUCKS

PROVED ON THE ALCAN HIGHWAY . . . CHAMPS OF EVERY WEIGHT CLASS! CHEVROLET

CHMOND REFERENCE GUIDE FOR YOUR CONCRETE CONSTRUCTION NEEDS

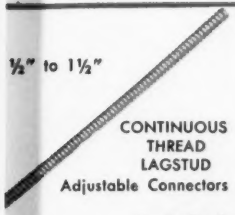
CUT OUT AND FILE



3000 lb
5000 lb
SNAP-TYS
Light Wall Forms
1 4

½" to 1½"
2 STRUT
TYSCRUS
Heavy Wall Forms
1 2 3 4

1" to 1½"
4 STRUT
TYSCRUS
Mass Concrete Forms
2 3



½" to 1½"
CONTINUOUS
THREAD
LAGSTUD
Adjustable Connectors
1 2 3 4

½" to 1½"
TYLOOPS
Form Anchorage
3

⅜" to 1½"
SCREW ANCHORS
AND BOLTS
Anchorage to Concrete
2 3

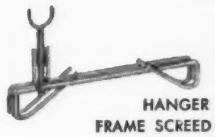
1¼" - 1½"
WHIRL-WIND
ANCHORS
(No Slip)
Lift Form Anchorage
3

¼" to ¾"
THREADED INSERTS
Fastening to Concrete
1 2 3 4

⅝" - ¾"
PEERLESS WEDGE INSERT
Shelf Angle Support
1

SNAP-TY
HANGER
Hanging Light Forms
1 4

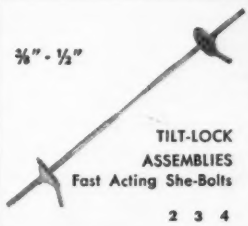
½" to 1
TYHANGER
Hanging Heavy Forms
1 2 4



HANGER
FRAME SCREED
Form Hanging
and Screeding
2

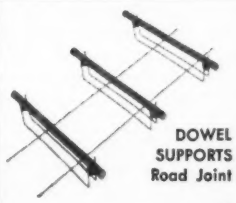
ADJUSTABLE
SCREED CHAIR
Screeding Slabs
1 2 4

REINFORCING
BAR SUPPORTS
Steel Support
1 2 3 4



⅜" - ½"
TILT-LOCK
ASSEMBLIES
Fast Acting She-Bolts
2 3 4

TYFRAME
Stadium Forms
1

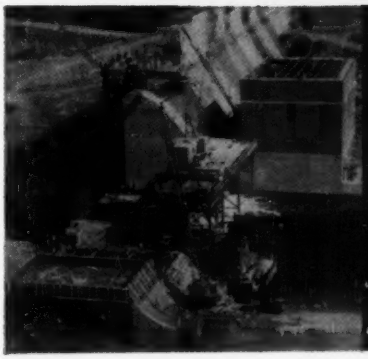


DOWEL
SUPPORTS
Road Joint
2

LOAD
TRANSFER
ASSEMBLIES
Airport Slabs
2

buildings ①

roads & bridges ②



tunnels & dams ③

water & sewage PLANTS ④

The above is a partial showing of the 358 items contained in the Richmond line of engineered concrete form-tying devices, anchorages and accessories—the largest line in the field. All items are designed for specific uses, not only for the fields pictured above but also for the building of *stadiums, grand stands, auditoriums, retaining walls, curtain walls, silos,* etc.

Whatever your concrete construction needs, contact Richmond. Richmond products are engineered to give you extra strength, ease of handling, utmost economy. Write for complete catalogue. If you have a specific problem, Richmond's Technical Division or field service men will be glad to submit drawings, engineering data and proposals. Address:

RICHMOND SCREW ANCHOR CO., INC. — 816 Liberty Ave., Brooklyn 8, N. Y. and 315 South Fourth St., Saint Joseph, Mo.

INSIST ON RICHMOND
... AND BE SURE IT'S RICHMOND!

Richmond
SCREW ANCHOR CO., INC

816-838 LIBERTY AVENUE · BROOKLYN 8, N. Y.
315 SOUTH FOURTH ST · ST. JOSEPH, MO.

RICHMOND REFERENCE GUIDE FOR YOUR CONCRETE CONSTRUCTION NEEDS

11 rock-speeding PAYHAULER® TRUCKS · star in seaway's biggest, single show!

8 other International® rigs help move 2,451,000 cu yd of rock and earth in $14½ million lock construction!

Eleven International "95" PAYHAULER trucks...because of their high speed, big pay-capacity and around-the-clock endurance...are playing the starring roles in the St. Lawrence Seaway's biggest, and perhaps toughest, single show!

The PAYHAULER units are sparking a demanding monthly production schedule of 120,000 yds of rock and 100,000 yds of common earth. The scene is United Waterways Constructor's $14½ million contract of the upper Beauharnois lock construction and channel excavation near Montreal, Quebec.

International TD-24 crawler tractors, TD-14 Skid Shovels, and a "75" PAYSCRAPER® are also vital producers in the moving of the total required 1,461,000 yds of rock and 990,000 yds of earth. Lock completion is scheduled for December, 1958.

PAYHAULER units have also been moving most of the rock on a lower Beauharnois lock. On a similar shorter-haul rock job in the midwest recently, two identical PAYHAULER units maintained a production average of 2,400 cu yds per day!...And here on the seaway, with average 4,000-foot one-way hauls, PAYHAULER units' high speed, next-to-automatic Torqmatic brake control, and minute-saving, easy-to-heap big capacity are cutting cycle time to a minimum and bringing home maximum loads as well.

The rugged PAYHAULER units on the seaway job are standing up to the toughest test in their spectacular career. They're working around the clock, 5 days per week, hauling mostly rock but also proving themselves in wet, job-fouling mud and on slippery, water-soaked lock floors.

Success on the seaway and on other tough jobs the country over is proving International PAYHAULER units to be what construction men themselves asked for...a big-capacity, high-speed hauler with low downtime and operating costs. See for yourself. Try an International PAYHAULER unit on your job.

TON-SIZED ROCKS go up...then down into fill in 12 seconds. Two-stage hydraulic hoist provides full-time power control. Hydraulic snubbing assures over-center dumping, gentles body return.

38 MPH SPEEDS keep three or four PAYHAULER units on haul road at all times. Hand-operated Torqmatic brake gives accurate control for safe, high-speed travel on congested haul roads. TD-24 tractor spreads rock for fill at railroad diversion.

MAXIMUM SHOVEL OUTPUT on upper Beauharnois lock construction is maintained by fast, easy-loading International "95" PAYHAULER units. High tensile steel sides, triple section bottom, super-duty "spring cushions" plus strongest frame in "95's" class stand rock-shock!

Construction details St. Lawrence Seaway Project #33

Project length	5,000 feet
Width of lock excavation	60 to 150 feet
Depth of lock excavation	54 feet
Approximate use and disposal of excavated material:	
40,000 yd brown clay	dyke construction
400,000 yd earth	random fill
500,000 yd rock	aggregate plant
270,000 yd rock	structure fill
70,000 yd rock	railroad diversion
60,000 yd rock	yard areas, construction roads
15,000 yd rock	rip-rap and dykes
15,000 yd rock	service roads

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

Over 225 International have whipped tough for Brown

All over Texas the TD-14's get jobs, and *produce!*

BUILDING FIRE WALLS IN LIBERTY. One of ten TD-14 tractors, recently purchased by Brown and Root, builds roads, flood dikes, and clears land for new well sites. New TD-14 provides genuine "in-seat" starting!

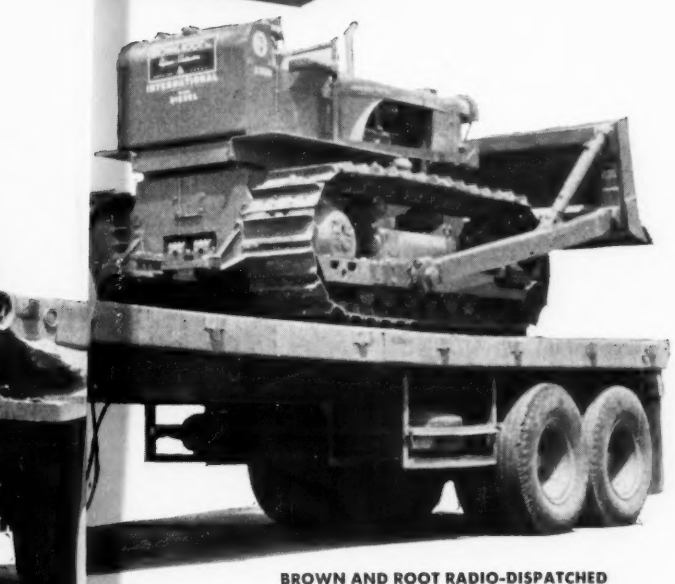
SPREADING AND COMPACTING IN HOUSTON. TD-14 with both ends busy, spreads fill and compacts it at the same time with a sheepsfoot roller. Construction is for preparation of new Juvenile Detention Home site for Harris County.

SPREADING FILL IN HOUSTON. This TD-14 levels land on 360-acre naturalistic park, on south shore of Lake Houston. The new bonus-powered TD-14 has new bridge-strong box-beam track frames—for big-capacity, tough-material dozing!

BACKFILLING TRENCH IN TEXAS CITY. A 74-mile long, 8-inch pipeline from Hull to Texas City undergoes its last operation with another TD-14. Cerametallic engine clutch facings reduce operator effort and prolong clutch life in fast "shuttle-dozing" like this!

REPLACING PIPELINE IN HOUSTON. Stationed near home, this TD-14 joins a trench-hoe to move muck for pipeline replacement in railroad yard, at Sheffield Steel Company. In muck, mud, or water, new track roller seals save inspections...exclude grit, retain lubricant.

TD-14's
bs everywhere
nd Root, Inc.*
ssociate Companies



BROWN AND ROOT RADIO-DISPATCHED TRUCK with International TD-14 gets "go-ahead" from dispatcher. Because of modern methods, Brown and Root TD-14's can be on the job anywhere in East Texas in just a few hours. No special haulage permit needed to transport the easy-to-truck TD-14!

International TD-14's give big contractor "middleweight" mobility and heavy work *power-punch*... to profitably finish jobs fast!

Internationally-famous contractor, Brown and Root, Inc., take the tough jobs wherever they are, from Guam to Guatemala—from Alaska to Calcutta. On work requiring 70-80 dbhp, they have purchased more than 225 International TD-14 crawlers to get unmatched job-to-job mobility and big capacity.

Another big reason for this choice, the TD-14 starts seconds-fast in all weather with famous International gasoline-conversion diesel starting. It's on the job fast without profit-gobbling delays!

Another big reason, new built-in operating ease, control tower visibility, hydraulic booster steering, clean geared-for-action deck, adjustable deep-cushioned seat. ALL add job-getting efficiency and cost-cutting capacity!

Other reasons: low operating cost; servicing ease! The heat-defying new Cerametallic engine clutch facings increase life, save adjustments! Famous micrometric fuel pump precision saves fuel, postpones overhauls. New track-roller seals hold greasing to 500-hr. intervals!

Reasons like these are why contractors everyhere are standardizing on bonus-powered International crawlers! Try one on your next job. Your International Construction Equipment Distributor will gladly demonstrate!

BREAKING DOWN RICE LEVEES IN ANAHUAC. Not all of Brown and Root Corporation's TD-14's work on industrial projects. This one tears down rice levees on a special assignment when oil field or other work is slack.

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

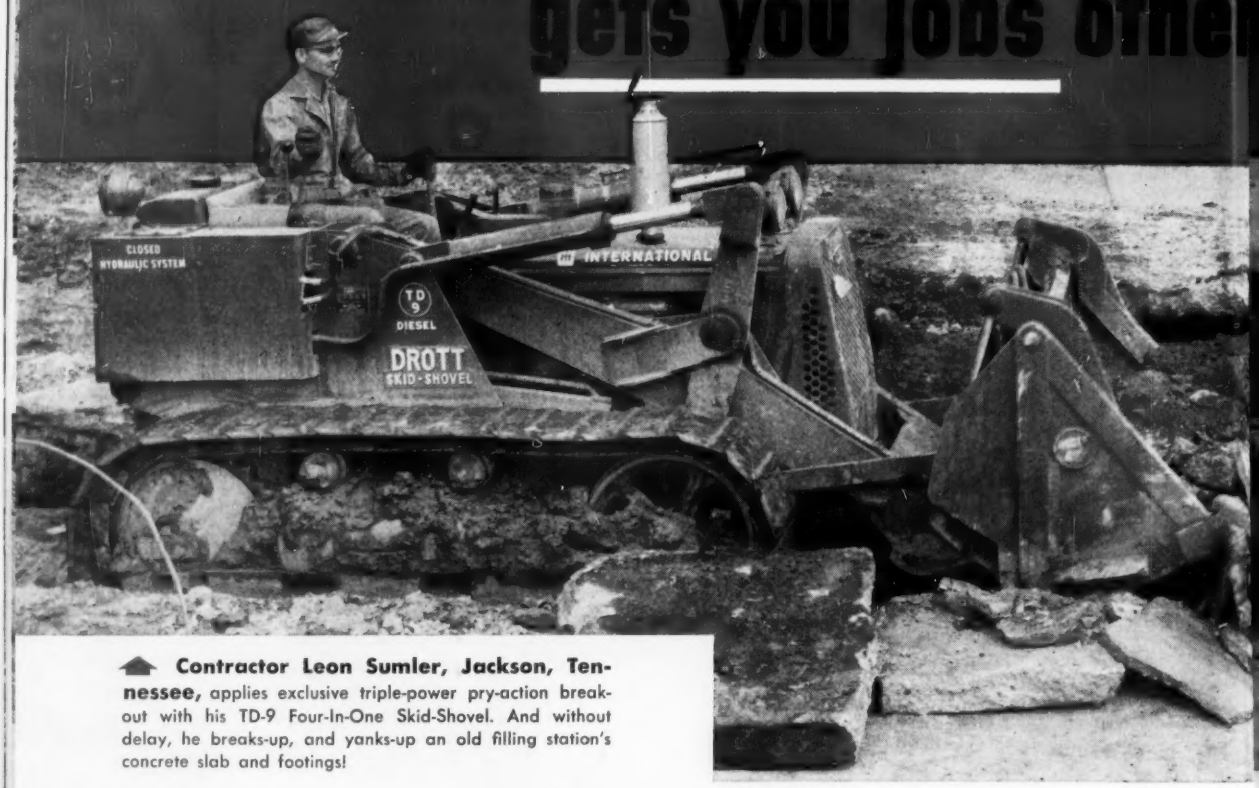
International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

How concrete-smashing

PRY-ACTION BREAK

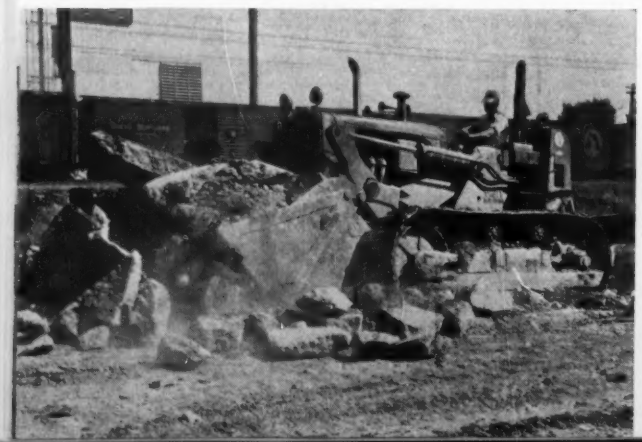
gets you jobs othe



Contractor Leon Sumler, Jackson, Tennessee, applies exclusive triple-power pry-action break-out with his TD-9 Four-In-One Skid-Shovel. And without delay, he breaks-up, and yanks-up an old filling station's concrete slab and footings!

This new 3-yd. TD-18 Four-In-One Skid-Shovel proved able to do as much as 3 power shovels and a dragline—excavating and loading up to 1,700 lineal feet of old concrete pavement daily—operating for Henry E. Berghuis, Prinsberg, Minn.

Street-widening and regrading calls for removing old concrete pavement—which the new TD-9 Skid-Shovel is loading out at 600 cu yds per day! Dennis Widmer, Portland, Oregon, owns this outfit with the job-getting break-out power!



AK-OUT...
hergs can't do!

Thirty-six times as fast as 3 men and a jack-hammer could do it—this TD-14 *broke-up, dug-out, and loaded* 180 lineal feet of old one-by-four-foot concrete wall, in only 4 hours! Owner: Anderson Trucking and Excavating, Inc. Buffalo, N. Y.

Pry-action break-out force ranges from 12,000 lbs. on the International Drott TD-6 Four-In-One Skid-Shovel—to 27,000 lbs. on the TD-18 model. For special applications like land-clearing, the TD-18 model can be equipped with larger hydraulic cylinders to develop 54,000 lbs. of break-out!

Patented and exclusive International Drott pry-over-shoe break-out action gives you *up to six times as much excavating power* as ordinary front-end loaders can deliver! Only an International Drott gives you this multiplied force of the scientific lever principle acting over big skid-shoes, and teamed with ground-level bucket roll-back. *No other loader even has skid-shoes!*

Only International Drott-developed reverse cylinder action produces the tremendous hydraulic power for pry-action break-out. And this pry-action principle shunts shock-stresses directly into the ground—so they can't maul loader or tractor.

Measure the job-getting, capacity-adding advantages of exclusive triple-power, pry-action break-out. Note how exclusive parallelogram raise action keeps the bucket level, all the way up—reduces spillage—increases your daily yardage up to 18%! Prove that exclusive, shock-swallowing Hydro-Spring protects equipment, adds operator comfort. And try the exclusive International Drott Four-In-One that *gives you four-machine utility* for one moderate investment—in your choice of four sizes, one-yard to three-yard capacity. See your International Drott Construction Equipment Distributor for a demonstration.

A tough oak tree with 22-inch trunk is uprooted with the tremendous pry-action break-out—applied by TD-14 using grubber blade attachment, instead of bucket. Owner Lester H. Davis, Bennington, Vermont, is clearing farm land.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL® DROTT®

more power...

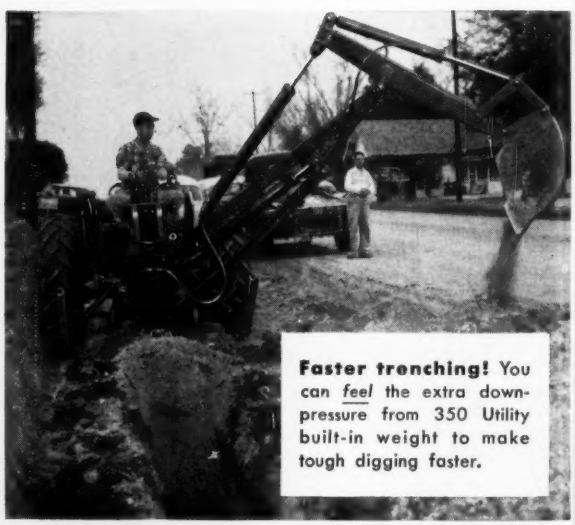
plus traction for every footing!

Sock a big loader bucket into a hard-packed pile! Feel the stepped-up power of the new International® 350 Utility tractor! See how a half-ton greater built-in weight knuckles in to give you traction for the big bites. See how big-diameter pneumatic tires provide full-load flotation . . . even on soft dirt or slick concrete.

Back out fully loaded! Let power steering help you turn sharp with a light touch of one hand. Your other hand is free to control the 1,500-pound loaded bucket high overhead. With power steering, you save time on every pass—cut costs every hour.

Tough going? Don't shift! Just pull the Torque Amplifier lever to boost pull or push-power up to 45%, *on-the-go.*

So try it! Call your IH dealer for a free demonstration on your job. Give him an opportunity to prove the International 350 Utility gives you extra power teamed with extra weight and stamina to outwork them all!



Faster trenching! You can *feel* the extra down-pressure from 350 Utility built-in weight to make tough digging faster.

SEE YOUR INTERNATIONAL HARVESTER DEALER

International Harvester products pay for themselves in use—McCormick Farm Equipment, Farmall and International Tractors . . . Motor Trucks . . . Construction Equipment . . . General Office, Chicago 1, Illinois

Financial Aid to Higher Education

A Fine Start, But...

This editorial has two purposes. The first is to salute American business for the fine start it has made in helping to relieve the financial plight of our colleges and universities. The second purpose is to stress the importance of having business provide more financial aid, and soon.

How Business Helps Higher Education

Business contributions to higher education doubled between 1950 and 1955. They jumped from $40 million to $80 million. Preliminary figures indicate they will be even higher this year.

Business firms have also shown a lot of ingenuity in devising different ways of making their contributions. The methods range from a matching of an employee's contribution to his particular alma mater to wide diffusion of the money through state and regional money-raising associations of colleges and universities. Thanks to this ingenuity, business firms now have a wide choice of ways by which to give effective aid. The way most appreciated by college administrators is the making of gifts unrestricted as to the purpose for which the money is used.

Imposing as it is, however, what business has done thus far is only a good start. Only a tiny fraction of the total number of business firms in the country are giving direct financial help to our colleges and universities; and this fraction includes fewer than half of the hundred largest corporations in the country. Also, the amount of financial help being provided by business constitutes only a very small fraction of what is needed.

Why Colleges Need More Aid

Right now our privately endowed colleges and universities need about $350 million more in operating income a year than they are receiving to enable them to pay decent faculty salaries and be in tolerably good working order otherwise. The reasons, including a severe decline in the purchasing power of their endowment income because of price inflation, have been dealt with in the previous editorials in this series.

In addition, these institutions, together with the tax-supported schools, are faced with a tremendous increase in enrollment over the years ahead. With both a rapidly increasing population of young people and an increasing propor-

tion of them going to college, this year's enrollment of 3.2 million students is expected to reach 4.0 million by 1960, and to be doubled by 1970.

For the next ten years our privately supported colleges and universities must have an average of about $400 million a year above what they can be expected to collect from tuition fees, income from endowment funds, etc.

This figure of $400 million does not include what is needed for new buildings and equipment. It also does not include help for tax-supported schools above what they get from taxes, fees, etc. Business has given and will continue to give these schools substantial aid. Indeed, almost 25% of the financial help from business for our colleges and universities went to tax-supported schools in 1955.

If aid from business met their needs for increased operating income, the privately supported colleges and universities would be given a decisive lift in performing successfully their part in our system of higher education. They would still have large needs of capital equipment — buildings, dormitories, laboratories — but help from other sources, such as that provided by devoted alumni, where they are well organized, could be expected to go far toward meeting these needs. Also some companies prefer to concentrate on meeting needs of this type.

What 1% of Profits Would Do

But do business firms have the capacity to fill the gap in adequate operating income for our privately endowed colleges and universities without putting an excessive financial burden on themselves? Those who have studied this capacity carefully say that the answer clearly is yes. If, of its profits before taxes — this year an estimated $43 billion — business were to devote 1% to helping our privately endowed colleges, it would take care of present operating needs of about $350 million a year. And the balance of $80 million would be a big step in meeting their needs for new buildings and equipment, too.

About one half of a 1% contribution of this sort would, in effect, be made by the federal government. Up to a limit of 5%, contributions of this type are exempt from the federal corporate income tax. For corporations with incomes above $25,000 per year this tax is 52%.

It is clear that not all business firms are in shape to devote 1% of their profits to aid to higher education. Even in this year of record-breaking prosperity, many of them will have no profits at all. But if business generally would take 1% of pre-tax profits as a target or benchmark for financial help to our privately endowed colleges and universities these institutions would again have sturdy financial foundations.

Relatively this is a very small price to pay (1) to insure a continuing supply of competently trained young men and women and (2) to buttress our freedom by assuring the successful survival of the privately supported sector of our system of higher education.

This is one of a series of editorials prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

Take a good, long look and see everything that's new and different in the 1957 Lorains. Modern cab designs, new models, different type crane booms, increased capacities, easier power controls, "Shear-Ball" mountings and torque converters . . . these are some of the more important features. There are many, many more—for more economical operation, increased output, greater operator comfort and ease of operation and greater efficiency in every way! These pages will give you an idea of what Lorain has to offer in 1957. TAKE A GOOD LOOK AT THE NEW LOOK IN THEW LORAIN.

take a look at the new 2½-yd. LORAIN-85A

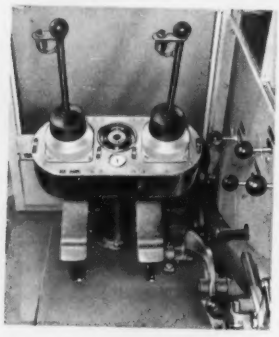
The new 2½-yd. Lorain-85A is the most different looking of the new Lorains because it wears the new cab design that is new in appearance, new in operator comfort, convenience and protection—and the rest of the "85A" matches the advanced cab design. Take a look at these features: 2-lever, "Joy-Stick", metered-air controls for all friction clutches—air control of all crawler operations—"Shear-Ball" mounting that eliminates center pin and rollers of all kinds—choice of 2 crawlers—torque converter power-take-off—new square-tubular-chord boom permitting lengths of 200 ft. plus tip—40, 50, 60-ton cranes.

Take a GOOD LOOK at these 3 exclusive LORAIN FEATURES

"SHEAR-BALL" MOUNTING*

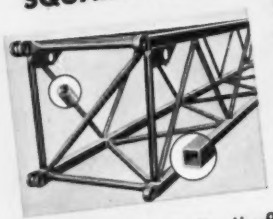
This exclusive patent-applied-for feature is standard or available on most Lorains. It truly gives "ball bearing," rock-steady swing and completely eliminates center pin and nut, centering gudgeon, hook or top rollers and exposed roller path with their attendant wear, need of adjustment and maintenance. There is nothing else like it.

2-LEVER "JOY STICK" POWER CONTROLS



This type of "Joy Stick" controls power-actuates all turntable friction clutches for easier, faster, simpler operation. Uses only 2 levers instead of the usual 3 or 4. Reduces operator motion, effort and fatigue. Increases production. Now available on all classes of Lorains. No other type of controls is so effortless to use.

SQUARE-TUBULAR-CHORD BOOM*



This new Lorain patent-applied-for boom design has startling advantages over conventional types. The main chords are of square tubing—the lacings of continuous round tubing welded at common points to the chords to create a "banding" effect. The result is a lighter, stronger, boom for increased lifting capacities and greater reaches with clamshell and dragline buckets. Available on all classes of Lorains.

*U.S. and foreign patents applied for.

CRAWLERS

Crawler-mounted Lorains are built to conquer the wor possible terrain and travel conditions. Many mode offer a choice of crawler lengths and widths, as we as tread widths to match job needs. Maneuverabilit ruggedness, good soft-ground flotation and resistanc to "nosing-in" are additional features of Lora crawlers.

MOTO-CRANES

Lorain Moto-Cranes provide unlimited rubber-tire, high speed mobility (up to 45 mph) to move between an around the jobs fast. "Moto-Crane" carriers are Lorain designed-and-built to do a job no commercial moto truck chassis can do under the stresses and strains o shovel-crane operation. Today's Moto-Crane is th result of 39 years of experience in building rubber-tir cranes . . . more than any other manufacturer.

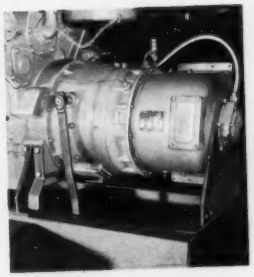
Look at these Lorain Crawler features

Travel mechanisms of all Lorain crawlers are enclosed in an oil bath. All crawler operations are controlled from the cab with turntable in any position of swing. Power-operated, 4-way ratchet and pawl tread-travel lock. Power steer. Power house lock. Power-operated jaw clutches. Chain driven. 2-speeds available in both directions. Many models available with independent travel, permitting simultaneous hoist, swing and travel.

See the New LORAIN-26 with "Joy Stick" Controls Booth No. 503

LORAIN CRAWLER MODELS

MODEL	TRAVEL SPEEDS	LIFTING CAPACITIES	SHOVEL CAPACITIES
Lorain-15	2	8 and 10 tons	½ cu. yd.
Lorain-25A	2	10 and 12 tons	¾ cu. yd.
Lorain-26	2	15 and 17½ tons	¾ cu. yd.
Lorain-50	1	20 tons	1 cu. yd.
Lorain-56	1	25 and 30 tons	1¼ cu. yd.
Lorain-72	2	30 tons	1½ cu. yd.
Lorain-85A	2	40 to 60 tons	2½ cu. yd.



TORQUE CONVERTER

Torque converter power-take-offs are available on all classes of Lorains. This is the most efficient, smoothest method of taking full advantage of the abundant power supplied for turntable operations. Lots of lugging and "never-say-die" power that adjusts automatically to digging needs; no machinery shock; no engine stall.

LORAIN MOTO-CRANE MODELS

MODEL	CARRIERS	LIFTING CAPACITIES	SHOVEL CAPACITIES
MC-107	6x4	7 & 8 tons	⅜ cu. yd.
MC-110	6x4	10 tons	½ cu. yd.
MC-254	6x4, 6x6	15 tons	¾ cu. yd.
MC-254W	6x4, 6x6	17½ tons	¾ cu. yd.
MC-424&W	6x4, 8x4	22½ tons	¾ cu. yd.
MC-425&W	6x4, 8x4	25 tons	1 cu. yd.
MC-530	6x4, 6x6, 8x4	30 tons	1 cu. yd.
MC-530W	6x4, 6x6, 8x4	35 tons	1¼ cu. yd.
MC-875	6x4	75 tons	....

See the New LORAIN MC-530W on 4-axle Carrier Booth No. 503

Look at these Lorain Moto-Crane features

6x4, 6x6, and 8x4 carriers available. Power steer. Power brakes. Big multiple tires . . . rear axles on rocker beams and ample tractive effort for off-the-road travel. "Dual-remote" control available on many models (provides one-man operation from turntable cab of both turntable and carrier operations). Crane booms up to 200 ft. Pin-connected booms. 2-piece, extensible tips.

LOOK WHAT'S NEW IN

SELF-PROPELLED CRANES

THE NEW LORAIN SP-107

LORAIN SELF-PROPELLED MODELS

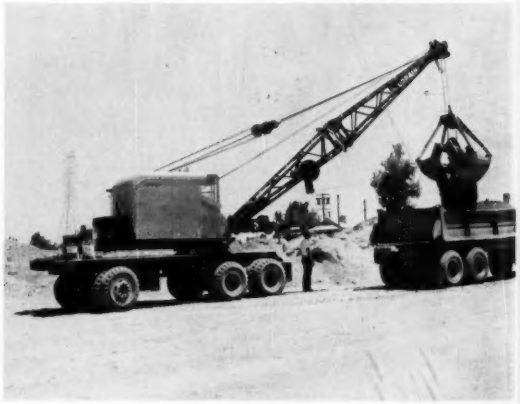
MODEL	CARRIERS	LIFTING CAPACITIES	SHOVEL CAPACITIES
SP-107	4x2, 4x4	7 tons	3/8 cu. yd.
SP-110	4x2, 4x4	10 tons	1/2 cu. yd.
SP-254	6x4	15 tons	3/4 cu. yd.
SP-254W	6x4	17 1/2 tons	3/4 cu. yd.
SP-424	6x4	22 1/2 tons	. . .
SP-530	6x4	30 tons	. . .
TSP-530W	8x4	35 tons	. . .
TSP-875	6x4	75 tons	. . .

The 7-ton Lorain SP-107 is an entirely new concept of the Self-Propelled shovel-crane idea. The SP-107 is designed to eliminate many of the mobility, maneuverability and job application limitations of the ordinary Self-Propelled machine. Here is the first Self-Propelled machine that can be classed properly as a contractor's tool—it is equally at home and profitable with shovel, hoe and dragline booms as it is with crane and clamshell attachments.

LOOK AT SOME OF THESE FEATURES:

7-ton lifting capacity • Completely convertible to crane, shovel, dragline, clamshell or hoe • 2 or 4-wheel drive • 2 or 4-wheel steer (4-wheel steer enables machines to "crab" sideways for a new degree of maneuverability) • Short-coupled, space-saving carrier • Full lifting capacity available on rubber—no outriggers to bother with • 2-speed transmission—can travel up to 15 MPH • Torque converter and automatic transmission • Independent travel for simultaneous hoist, swing and travel • Power steer • Full hydraulic controls.

A complete line of conventional, long wheel base Self-Propelled models also is available in the Lorain line. Available from 10 to 75-ton capacities, in single-engine and twin-engine types. 2-, 3- and 4-axle carriers available.



The Thew Shovel Co., Lorain, Ohio

Will your new shovel-crane stay up-to-date?

If you haven't bought a machine backed by a sound, progressive parts program, it quickly can become out-of-date, less efficient than your competitors', more costly to operate, robbing you of jobs and profits as newer, more modern models are produced.

If you buy a Lorain, you can look to Lorain to protect your investment by providing specially selected "Parts Kits" to enable you always to bring your machine up-to-date to match current production designs and improvements . . . to enable you to convert a complete assembly from an original design to another of a more modern design or purpose . . . to save you money when replacing assemblies or subassemblies. Lorain Parts Kits frequently will cost you less for an entire assembly than for the replacement of a few parts.

Printed in U.S.A.

When it comes to torque converter-equipped crawler tractors, few contractors can claim the experience of Edward J. Petrillo, president of Yonkers Contracting Company, Inc., Yonkers, N. Y. He's been advocating torque converter drives ever since Allis-Chalmers first introduced them for heavy-duty tractor use back in 1940.

There's good reason for Mr. Petrillo's use of torque converter drives. Says his Chief Purchasing Agent & Equipment Manager, Charles S. Campello: "Our Allis-Chalmers HD-21's, and their predecessor HD-20's and 19's, have never been down due to torque converter trouble—and we've used them on some of the biggest, toughest jobs in the East. All we ever do is give them normal field maintenance, which consists of checking the torque fluid level and conventional lubrication. Time required for this is insignificant."

Currently Mr. Petrillo has more than 50 A-C Crawler Tractors equipped with A-C torque converter drives. And, of course, A-C standardizes on Twin Disc Torque Converter components. But there's much more than just trouble-free operation behind his choice of torque converter drives. Production-wise, the torque converter automatically matches output torque to load conditions—with minimum or no gear-shifting . . . cushions out shocks and vibrations to reduce parts wear and breakage . . . and provides accurate load control.

Put a torque converter-equipped machine on your next job—particularly where operating conditions are really rough. See for yourself what Twin Disc Torque Converter drives can do for *you*!

Working with scrapers, these A-C HD-16's use torque converter drives (optional). Current HD-21's use torque converter drives as standard . . . but with either model the torque converter components are Twin Disc's.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division), Rockford, Illinois

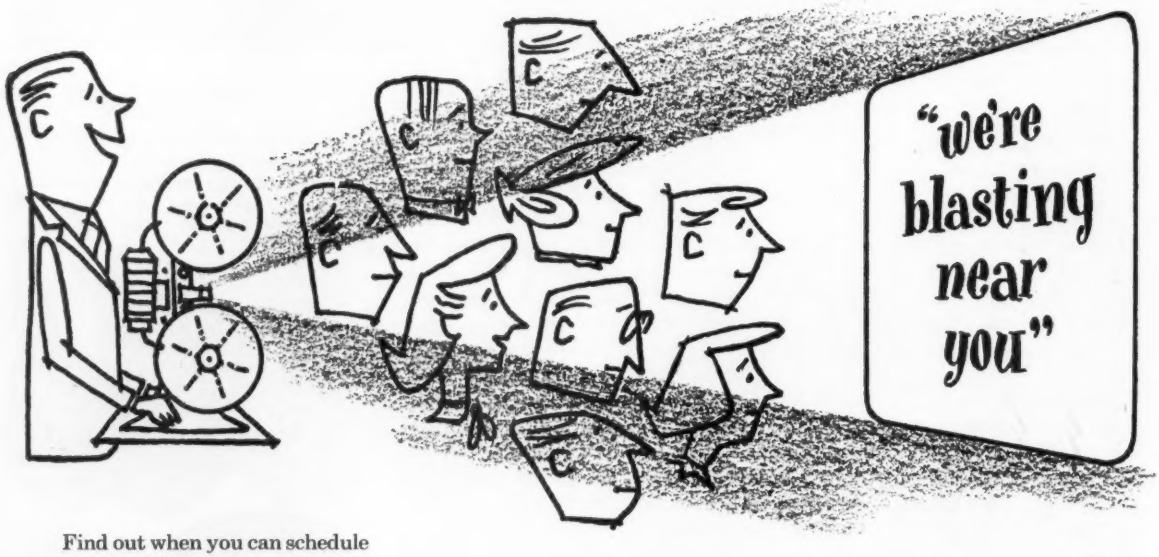
Here's a new, effective way to aid your public relations in the communities where you are blasting. It's the interesting, informative sound film in color, entitled, "*We're Blasting Near You.*"

This movie tells why blasting is necessary, and the steps you are taking to be a "good neighbor." It shows how millisecond delay techniques eliminate the old fashioned, jarring explosions of the past . . . how modern blasting methods hold noise to a muffled minimum and make vibration unnoticeable.

"*We're Blasting Near You*" can be shown to any age group: schools, service clubs, civic organizations. It is accompanied by a kit which includes suggested news releases, a sample introductory speech for the person presenting it as well as safety posters, and other helpful material. Show this unique new movie in your area. It can be an important help to you.

New film...

builds goodwill for users of explosives



Find out when you can schedule "*We're Blasting Near You*" in your community. And ask for "*Better Blasting,*" the Atlas newsletter on latest methods and materials.

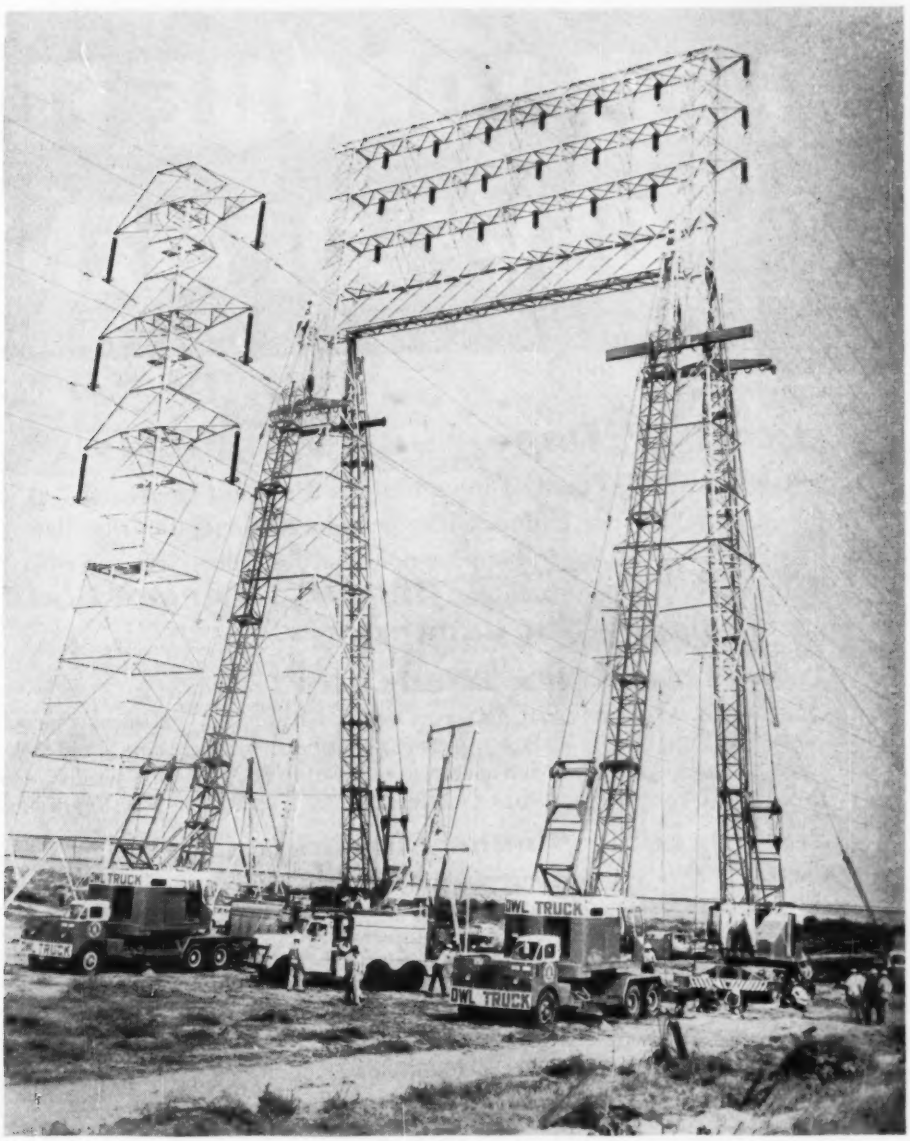
Technical Customer Service Section

ATLAS POWDER COMPANY

WILMINGTON 99, DELAWARE

offices in principal cities

PICTURE OF THE MONTH



Lifting Hot Wires

• While electric circuits transmit power without interruption, four 35-ton P&H truck cranes boost a transmission tower 32 ft into the air and hold it while extensions are bolted to its legs. The 77,000-lb tower had to be raised to provide additional clearance over a railroad track near Long Beach, Calif. It carries seven 66,000-v electric circuits of which five continued to transmit power during the lifting operation. Owl Truck & Construction Co. of Compton, Calif., completed the job in one 8-hr shift.

D-A announces...

NEW TORQUE FLUID DEVELOPMENT

Another Important D-A First!

This all new D-A Type C Torque Fluid is the result of extensive laboratory research, thorough field testing and painstaking analysis of operating results. Already approved for all Allison Torqmatic Transmissions and Retarders, it is currently being field tested by other leading manufacturers. ***Only D-A Torque Fluid offers all these important advantages:***

1. *Seal Troubles Eliminated!*

Contains a *new* additive that preserves original resiliency of the synthetic rubber seals . . . prevents seal hardening, cracking and shrinkage . . . and controls seal swell to 0.2%. D-A Type C Torque Fluid *stops* fluid leakage.

2. *Varnish & Sludge Eliminated!*

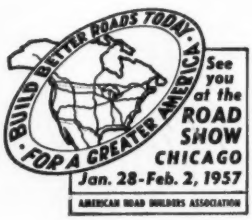
Contains a *new* type high-temperature oxidation inhibitor that prevents varnish and sludge formation on pumps, valves and blades — even at highest permissible operating temperatures.

3. *Usable Down to Minus 35° F.!*

Pour point of minus 35° F. assures adequate lubrication and maximum efficiency even at coldest winter temperatures.

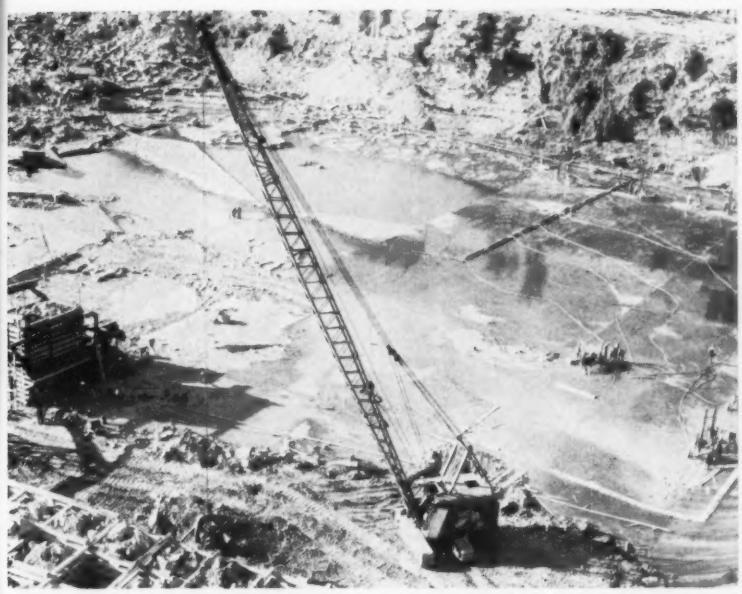
These combined characteristics of D-A's new Type C Torque Fluid assure users of *less fluid consumption . . . longer converter and parts life . . . and efficient cold-weather operation!*

This new torque fluid is available *now* . . . in D-A warehouses across the nation. Contact your nearest D-A Representative for complete details.



D-A LUBRICANT COMPANY, INC. • Indianapolis 23, Indiana

Construction News in Pictures . . .

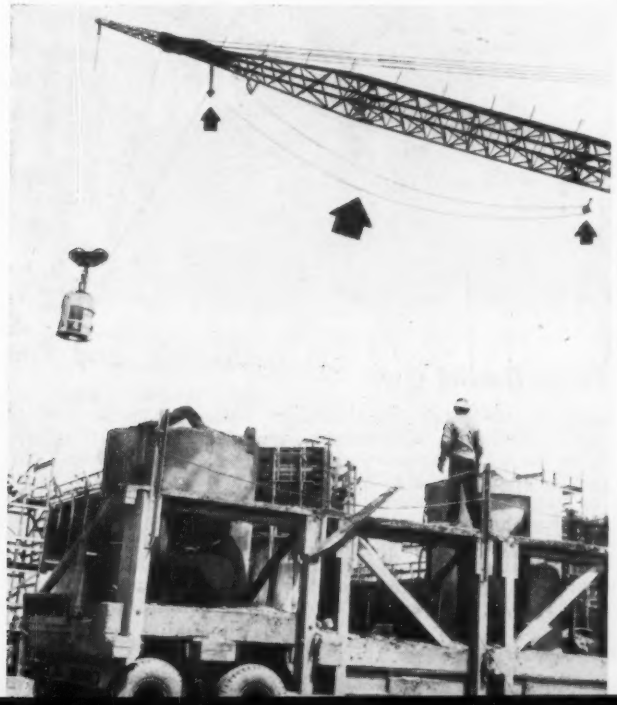


Big Lift Lock

A 40-ton Manitowoc clamshell fills timber cribs for a cofferdam at Wilson Dam, Ala., where the Tennessee Valley Authority and the Army's Corps of Engineers are building the world's largest single lift lock. The lock will be 600 ft long, 110 ft wide and will have a maximum lift of 100 ft. It will replace the present three-stage lock. The project is scheduled for completion in 1960.

Tall Tower ▶

Scaffold tower reaches 342 ft up the rear wall of the Koppers Building in Pittsburgh, Pa., to permit installation of air-conditioning ducts through the wall. The structure weighs 10,218 lbs and has 12 planking levels. It was erected of Safway 5 x 7-ft scaffolding on the roof of the loading dock with Safway telescoping steel shores on the ground under the dock beneath scaffold legs.



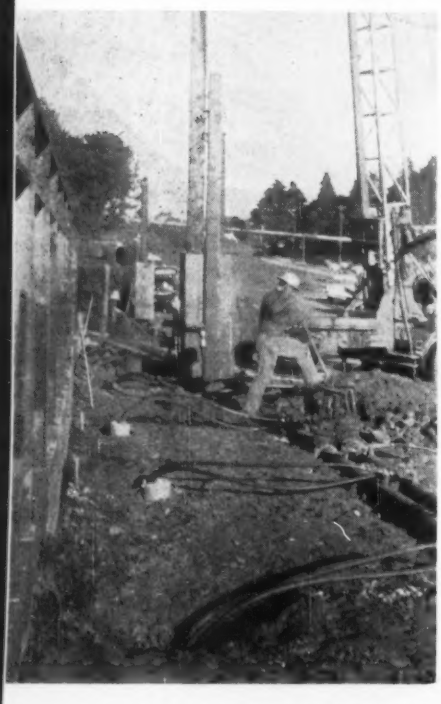
◀ Does Two Jobs

A 220-ft air hose (arrow) does double duty for Walsh Construction Co. at Long Sault Dam on the St. Lawrence. It carries compressed air to operate the remote controlled crane hook that picks up 12-ton buckets of concrete and places the concrete in the forms. And it serves as a conduit. Inserted through the hose is an electric cable that controls the air supply solenoid valve. Hose is B. F. Goodrich's type 50.

Continued on next page

Tractor Rides High

Guy F. Atkinson Co., San Francisco, demonstrates a fast way to move a tractor from one bank of a river to the other. Atkinson simply picks up a 28-ton Cat D8 and highlines it across. The job is Pelton Dam, 110 mi southeast of Portland, Ore. When completed for Portland General Electric Co. in March, 1958, the project will have a capacity of 120,000 kw.



Wells Drain Cut

California Division of Highways solved a drainage problem in a big cut for the new Mountain Boulevard Freeway at Oakland by driving 3,000 ft of 8-in. pipe to serve as wells and then pumping the water out with wellpoint equipment. Pipe used was perforated Hel-Cor and corrugated metal pipe supplied by Armco Drainage & Metal Products, Inc.

Simple and Cheap

A "sandwich wall" constructed in place encloses Duquesne Brewing Co.'s new bottling plant in Pittsburgh, Pa. The wall is simple, cheap, and easy to erect. It consists of two sheets of aluminum siding with an insulating core of 1½-in. Foamglas blocks and is secured to structural members with stainless steel self-tapping screws. Contractor is Elwin G. Smith, Emsworth, Pa.

DON'T PULL THAT TRIGGER, MAN—

Just because you're in trouble with bearings.

It's much easier to get the man from **SKF** to tell you what bearings will get you out of trouble *and keep you out.*

If you operate dozers, scrapers, pavers... trucks and tractors... conveyors, shovels and draglines... pumps, cranes and mixers... **SKF** can supply the right bearings... made just *right for the roughest and toughest service.*

Visit the **SKF** Booth at the Road Show (#203 – Second Floor of South Hall) in Chicago's International Amphitheatre – January 28 through February 2. There you will get the straight information on bearings from the men at the booth.

You'll find out you can throw your gun away – *you won't need it!* 7759

SKF®

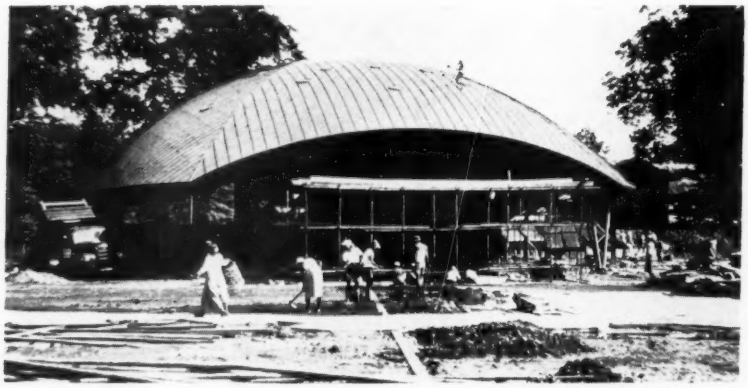
EVERY TYPE—EVERY USE

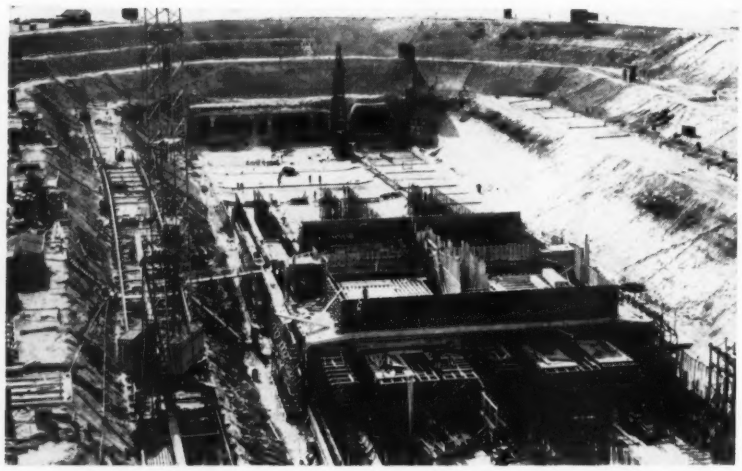
- *Ball Bearings*
- *Cylindrical Roller Bearings*
- *Spherical Roller Bearings*
- *Tapered Roller Bearings* ("Tyson")

® Reg. U.S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

Construction 'Round the World . . .





In Burma ▲

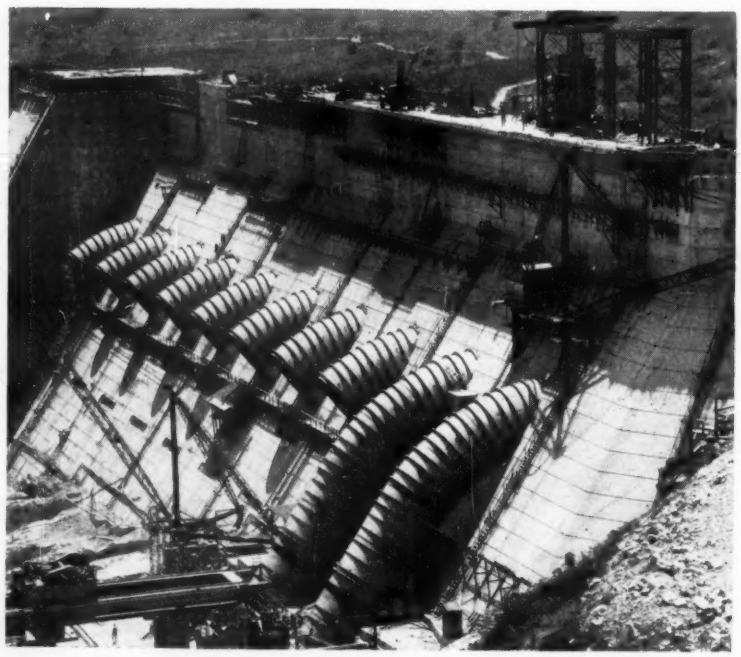
The assembly hall of the new Rangoon University Engineering College boasts a timber roof of unusual construction. It is a turtle-shell dome 150 ft long and 90 ft wide composed of five layers of double-curved Burma teak glued together and covered with copper sheeting. Total thickness is 3⅜ in. During construction, the roof was supported by 37,000 ft of scaffolding. Contractor is Taylor Woodrow, Ltd., London.

In the Netherlands ▲

Constructing the tunnel under the North Sea Canal at Velsen in an open cut will leave underground fresh water supplies undisturbed. Brackish water in the soil up to 53 ft below the surface is separated from fresh water still deeper by a 3-ft layer of clay which is stockpiled and replaced later to maintain the separation. Wellpoints and British-made Sumo pumps dewater the excavation while concrete is placed.

In Brazil ▶

The first 40,000-kw unit at Peixoto Dam in Brazil is in operation, and a second unit is scheduled to go on the line this month. Eight additional units will be added later to bring total capacity to 400,000 kw. Peixoto is part of the Rio Grande Valley development of the Brazilian subsidiary of American & Foreign Power Co. with Ebasco Services, Inc., as consulting engineer. The dam is an arch between two gravity sections.



BIG 25-yard "B"

makes 180° turns in 35′

Steering motor, on king-pin housing, operates direct from current provided by Tournapull generator. With only two parts, rotor and stator, these brushless motors apply power simply. Motors are not affected by dust, moisture, rain, or sub-zero weather.

The BIG B Tournapull turns around without backing in a space only 35′ wide... over 5′ less than its 40′6″ over-all length. This 90° turnability lets you work in restricted areas and on narrow fills where other big scrapers cannot operate.

Maneuvers in close quarters

No steering jacks or other structural parts interfere with "B's" full 90° turns. Positive geared steer on king pin helps to maneuver fast in close quarters. These advantages mean bigger production in less time, and eliminate need for costly construction and maintenance of special turn-around areas needed for other rigs.

"Feather-touch" steering

Little effort is required to steer the B Tournapull. Electricity does all the work. Operator never has to "fight" steering wheel, no matter how tough the going.

An electric motor mounted on steering king pin turns a heavy-duty ring gear mounted on prime-mover. As ring gear turns, prime-mover pivots on the king pin. Prime-mover continues to turn as long as steering wheel is rotated. The instant this rotation is stopped, a brake automatically locks the steering motor. Tournapull then continues to travel in the selected direction, regardless of underfoot conditions, until wheel is again rotated and action repeated.

"B" walks out of soft spots

Positive electric power-steer makes it easy to work BIG "B" quickly out of a soft spot. Rotating wheel back and forth causes prime-mover to swing from side to side. This "walks" the drive wheels to fresh footing and moves trailing unit ahead with each swing of the prime-mover.

Why not find out for yourself how the BIG 25-yard B Tournapull, with its mudability and 180° turnability, can help you get bigger pay-yards on your earthmoving. Ask for owner-verified reports on "B" production.

Tournapull—Trademark Reg. U.S. Pat. Off. BP-964-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

THE BUFFALO-SPRINGFIELD K-45 KOMPACTOR

How to select compaction equipment

The logical question to ask yourself when you are ready to buy new compaction equipment is: "Exactly what do I need the equipment for and how will I use it?"

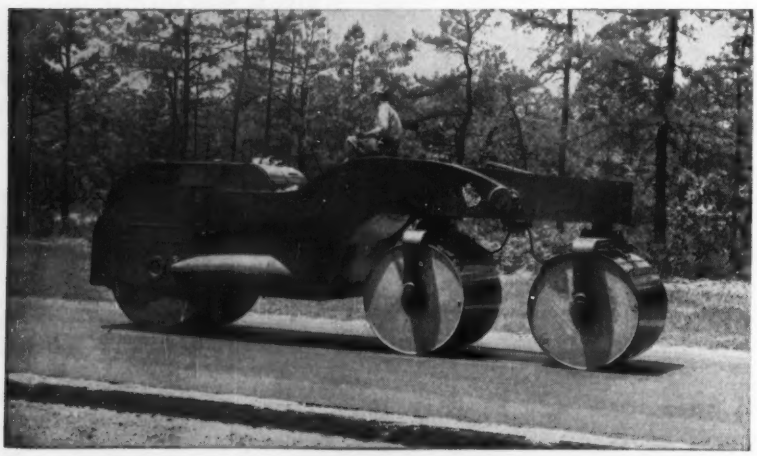
BASE FILL COMPACTION—This type of compaction demands equipment that will handle a wide variety of materials, give you the highest degree of compaction with the fewest passes. Buffalo-Springfield's revolutionary K-45 Kompactor is proving a real money-making answer for this type of work. It is self-propelled, relies on the "Interrupted Pressure Principle." All compaction effort is directed downward. Contractors testify they are meeting density requirements in one-fourth the time normally required with other compaction equipment.

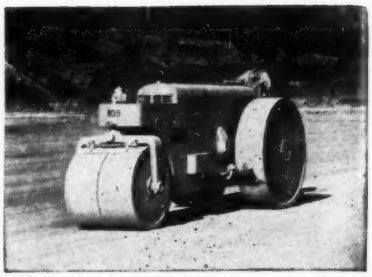
FINE GRADE FINISHING—Buffalo-Springfield offers six 3-wheel rollers, ranging in capacity from 5 to 15 tons, to handle the large variety of materials found in fills, subgrades and unfinished bituminous pavements. The variable-weight 3-wheel roller is ruggedly built for years and years of hard, maintenance-free work.

Buffalo-Springfield's thoroughly-proved 3-axle tandem "walking beam" roller provides up to 60% greater tonnage compacted per day in superhighway construction, airport and military establishment jobs where specifications are extra strict.

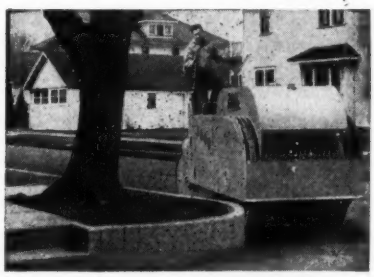
ASPHALT FINISHING—Two-axle Tandem Rollers are designed especially for all surface finishing jobs. Ranging from 5 to 16 tons, Buffalo-Springfield Tandems are used for heavy-duty highway and public works projects, and all types of finishing, maintenance and repair work. A wide selection of models for the biggest to the smallest jobs are designed for long-life and profitable operation.

THE BUFFALO-SPRINGFIELD KX-3 AXLE TANDEM



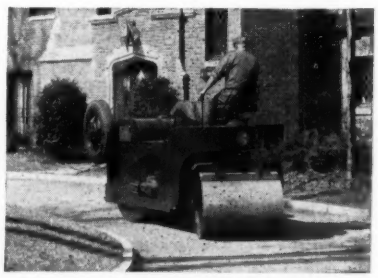


3-WHEEL ROLLERS



TWO AXLE TANDEMS

SHORT ROLLING JOBS—Buffalo-Springfield's 3-5 ton portable roller is widely used for rolling driveways, sidewalks, parking and playground areas, and for patching and light finishing jobs. It is highly maneuverable and portable from job-to-job. Write today for full information on the type of equipment you need—or see your nearest distributor for an on-the-job demonstration.



3-5 TON PORTABLE TANDEM

THE STANDARD OF COMPARISON

KOEHRING

BUFFALO-SPRINGFIELD
Roller Division-Koehring Company
SPRINGFIELD, OHIO

Construction Methods AND EQUIPMENT

JANUARY, 1957

VOLUME 39 • NUMBER 1

HENRY T. PEREZ, Editor

Roadbuilding's Golden Era

"IF THERE IS ANY ONE GROUP in this country that has broader opportunities today than the roadbuilders of America, I am at a loss to name it." Thus spoke interim Federal Highway Administrator John A. Volpe at a recent meeting. And the roadbuilder's opportunity is also one for his partners—the material producers and suppliers, the manufacturers and distributors of construction machinery, and all those who furnish him with the host of other services he needs to get the job done.

The prospect is alluring: The federal highway program is the largest public works project ever undertaken. It probably will see an expenditure of some $100 billions of federal, state, and local monies devoted to roads over the next 13 years.

But this long-range plan, of course, does not automatically guarantee contractor prosperity despite the volume of work involved. The inefficient roadbuilder will find the going rough. And while he's still around he will make it rougher yet on other misguided contractors who bid, not on the basis of their own costs, but on what they expect competing bidders will do.

Nevertheless, the opportunities are there for wide-awake roadbuilders who know their business. And it is more than just an opportunity to make money. It is an opportunity to serve America with all the knowledge, skill, and physical resources at the command of the industry. If all take advantage of them, it will truly be roadbuilding's golden era.

The Roadbuilders

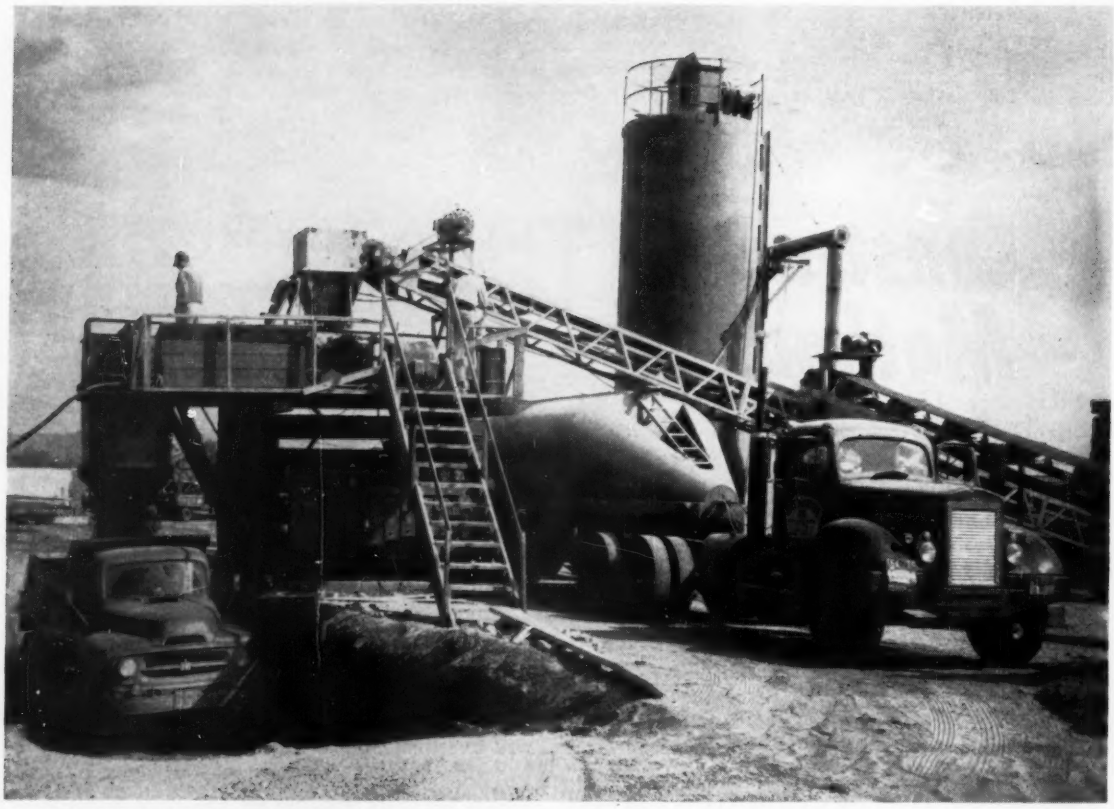
WHO ARE THE ROADBUILDERS and what do they do? "They give us a million miles of freedom," says Boston's John Hancock Mutual Life Insurance Co. in an ad addressed to the general public.

"You've seen a thousand of them, a thousand times, down a thousand roads. An old hat squashed back on the head, flannel shirt, faded khaki pants—and distance in their look. Sometimes they're just yanking a bad kink out of an old road. At other times they're building a great new super highway, wide as a city block and a whole state long.

"They're the roadbuilders, but what they really build is freedom. Freedom for all of us to go rolling across the land and see what our country is all about.

"If a big hill blocks the way, they grab a hunk of it and move it over there. Or they wing you across a mighty river on one great sweep of steel. Need a tunnel? There it is—right through a granite mountain. They have shown us how to get from Philadelphia to Pittsburgh across Ohio to Indiana in one smooth, effortless roll. Or they swing us around Boston traffic and put us deep into the Maine woods so easily we can't believe we're there.

"Next time you wheel along a wide, smooth, ribbony highway, look around. The roadbuilders have been here. They have gathered closer all this big, beautiful land and put it just outside your windshield. They did it with sweat, and know-how, and an American love of freedom—and every foot of it is yours."



CENTRAL MIXING PLANT operates 9 hr a day, turning out cement-treated base material for freeway. Barber-Greene pug mill is fed by conveyors running to the two aggregate stockpiles. Truck (right) delivers cement for storage in silo.

They Beat Winter Weather

HIGHWAY WORK this time of year often is a race to get on with the job while the sun is shining. McAtee & Heathe, Inc., and F. R. Hewett Co., joint venture contractor for 5.1 mi of freeway extending east from Spokane, Wash., won the race with a fast-paced operation that included a central mixing plant to turn out soil-cement base material.

The joint venture held a $705,019 contract to mix and place 154,000 sq yd of soil-cement base on the two 25-ft wide lanes of the freeway and top it with 31,930 tons of asphaltic concrete surfacing.

Specifications allowed the contractor to choose between central mixing or in-place mixing of the soil-cement base. The joint venture decided on a plant mix operation partly because it would provide better quality control and partly because it would permit starting or stopping the work to take ad-

TRUCK dumps soil-cement mixture into Jersey spreader pushed by Caterpillar D8 tractor. Contractor placed 7 in. of base material so compacted thickness would be 6 in.

vantage of every break in the uncertain early winter weather.

There was plenty of urgency in the placing work. Specifications required that the base be in place and all rolled out within 2 hr after the water hit it in the central mixing plant. To meet this requirement, the contractor generally laid just 400 ft in one lane at a time. And when weather turned bad, they could stop with little difficulty.

With a crew of 16 to 22 men—including 4 or 5 men to operate the central mixing plant—and 4 to 9 trucks—depending on length of haul — the contractor completed placing the 6-in. soil-cement base in just 19 days.

The mixing plant consisted of a Barber-Greene pug mill fed by conveyor belts running from two aggregate stockpiles. Cement came from an adjacent silo. Aggregates, sand, and cement were calibrated in pounds per minute through gates, and water was added in the pug mill from three spray bars through a water meter.

The contractor found a locally available supply of aggregate that met requirements except that blending sand had to be added to make up for a deficiency in fines. Specifications called for aggregate to meet these requirements:

Sieve Size	Percent Passing
1 in.	100
¾ in.	90-100
⅜ in.	65-90
¼ in.	50-80
#4	40-75
#10	30-60
#40	13-36
#200	3-15

The soil-cement mixture was 4% cement and 6% water by weight. Specifications required the base to reach 650 psi in 7 days; tests on cylinders ran as high as 1,200 psi.

The contractor worked the plant on a 9-hr shift. This meant that placing operations usually ran for an 11-hr period. The plant was capable of producing 450 tons per hr, but it operated most of the time at a 300-tph rate.

Trucks hauled the material from the plant and dumped it in a tractor-pushed Jersey spreader that laid a 12½-ft width. The mix was placed 7 in. thick so that compacted thickness would be 6 in.

First step in compaction was a pass by a Jackson vibratory compactor. Then a Caterpillar motor grader skimmed off the top ½ in.

MOTOR GRADER blades gravel shoulder against the soil-cement base material immediately after it is placed to prevent feathering of the edge of the base during compaction.

FIRST COMPACTION is carried out by a Jackson vibratory compactor with electrically powered compaction plates. Motor grader and 10-ton tandem roller complete compaction.

NEXT STEP is to skim off about ½ in. of the surface to remove irregularities caused in placement. Grader then replaces this material to form a smooth base surface.

FOG WATER SPRAY sometimes is necessary to replace moisture in the material lost during placing and surface smoothing operations.

TANDEM ROLLER completes compaction. Specifications require base to be rolled out within two hours after material is mixed.

CURING COAT of emulsified asphalt (SS-1) is spread over soil-cement base by Etnyre distributor at rate of 0.15 gal per sq yd.

in one pass and replaced it in a second pass. This removed irregularities resulting from the placing and initial compaction.

Then, if necessary to replace moisture lost during the placing and surface smoothing operations, a tank truck made a pass with fog water spray equipment. A 10-ton tandem roller completed compaction. Final step was placing of a curing coat of emulsified asphalt, spread at 0.15 gal per sq yd.

The soil-cement base was laid on a 2-in. course of stone placed on the gravel subgrade. Final surfacing was a 3-in. course of asphaltic concrete laid in two 1½-in. layers. Shoulders were surfaced with stone chips bound by a seal coat.

Major qualities involved in the base included 40,340 tons of aggregate bid at $0.95 a ton, 9,870 tons of special blending sand bid at $2.15 a ton, 11,050 bbl of portland cement bid at $4.95 a bbl, 154,000 sq yd of mixing and placing bid at $0.19 a sq yd, and 160 tons of emulsified asphalt curing coat bid at $75.50 a ton. The job also included 31,930 tons of class B asphaltic concrete bid at $5.80 a ton.

For the contractor, Harold Haneke of F. R. Hewett Co. was superintendent, and David Heimbigner of McAtee & Heathe, Inc., was spreading foreman. For the Washington Department of Highways, R. Ross was district engineer, B. L. Huffman was district construction engineer, and R. B. Leary was resident engineer on grading and paving contracts. Paul Carnine was resident engineer for bridge construction on the project.

Electronic Tools Aid Roadbuilders

By ROBERT H. DODDS
Lockwood, Kessler & Bartlett, Inc.
Consulting Engineers
Syosset, N. Y.

THERE ARE DIVIDENDS ahead for the contractor in the highway designer's current enthusiasm for "wonder tools" like electronic computers, photogrammetry, and seismic sub-surface surveys.

Benefits range from better construction quantity data to faster final payments. Jobs will be ready for award sooner, and it will be possible to coordinate bidding dates on a regional basis.

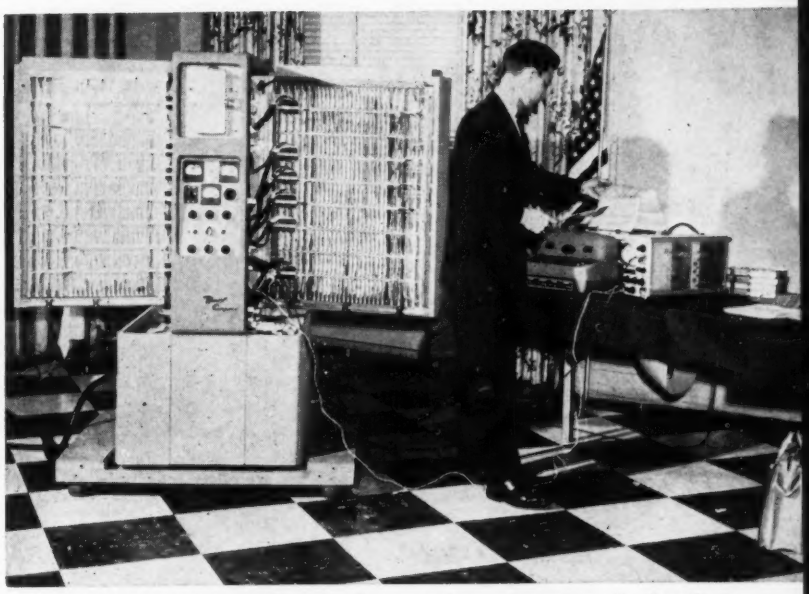
The contractor may be skeptical about interstate (and intrastate) cooperation on bid dates, but he has heard enough about electronic computers to believe that they can solve a complex problem in coordination.

And, accustomed though he is to the wonders of mechanization, the contractor will be amazed to learn how far automation has gone in the imagination of highway engineers.

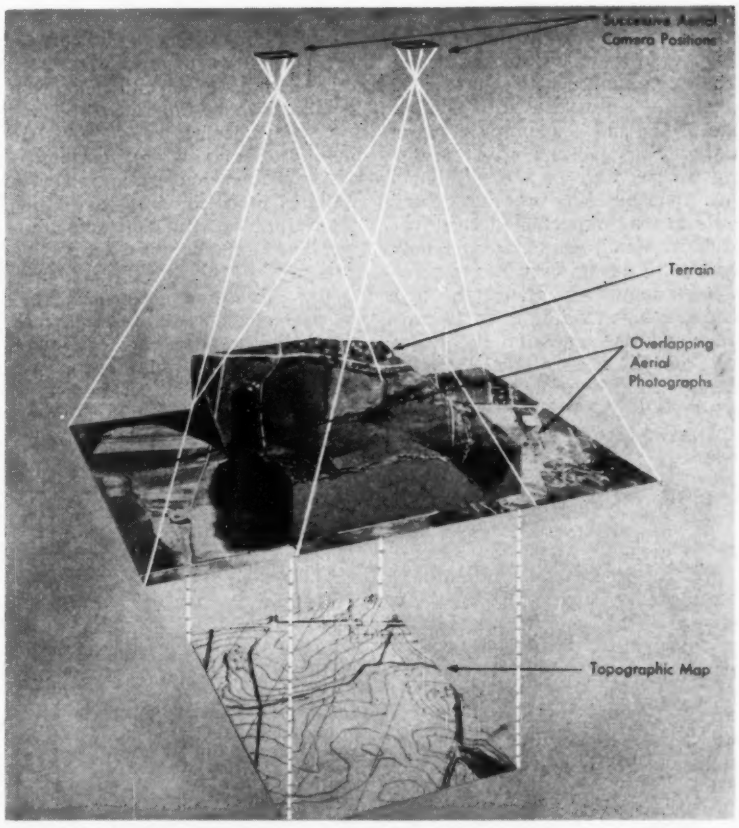
Automatic highway design is within reach. The devices are available, and the thinking is big enough to hook them together. One consulting engineer already claims he can put aerial photographs in at one end of an automated production line and take out a completed roadway design at the other end.

The photographs, controlled by a minimum of ground surveying, will provide all topography. Without the aid of an operator a stereoplotting instrument will feed the terrain data directly to an electronic computer. Given a complete set of design criteria the computer will find the most economical location between two points. By the addition of "sub-programs" and their required input data the computer will take into consideration such non-terrain factors as subsurface conditions, prohibitive areas of land-use (cemeteries, valuable commercial properties, etc.), traffic, and drainage factors.

Line and grade choice will be only a part of the automatic output. Structure locations and sizes, interchange types, widening and daylighting at curves, and slopes to suit earth conditions will be specified. Earthwork and other major quantities as well as the engineer's



ELECTRONIC COMPUTER speeds earthwork computations and promises other benefits to contractors. This Bendix G-15 sends earthwork data direct to automatic typewriter.



STEREO-MAPPING begins with consecutive aerial photographs. Operator sees a 3-D image of terrain covered by overlap. Contour map (bottom) is the result of stereoplotting.

WILD A-5, a Swiss instrument, enables operator to read spot elevations for cross-sectional data directly from 3-D image of overlapping photos (in projectors under yoke at right). Recorder (left) inscribes elevations on map as stereo operator calls them out.

WONDER TOOLS . . . continued

estimate—just about everything but the printed contract, drawings, and specifications—are expected.

This colossus of automation involves no mean investment. At the core of the operation is an electronic computer renting for $35,000 a month—almost the full price of one of the smaller computers that highway engineers are just beginning to use. But in a $3 billion a year road building program design costs can be expected to run over $100 million. Anticipated money savings in design cost due to complete automation amount to 30%. Time savings leading to early contract awards compound the benefits from the construction industry standpoint. Assuming one hook-up can handle a tenth of all the design work, the money seems worth investing.

Benefits for Contractors

"What's it worth to the contractor?"

Well, it's conceivable that precise monthly earthwork estimates, now a rarity, can be turned out in short order as soon as new aerial photographs are made. This would require only a small part of the whole automatic procedure. By the same token, final estimates could be made, priced, and paid fast.

Automation, however, is the only untried part of the concept of using aerial photography to hasten final payments. Although the method has not attained wide use, contractors have been watching its best-known trial at Aliquippa, Pa. There, air maps of original terrain have been used in conjunction with new air maps of as-built condition to determine the final quantities for a heavy side-hill road cut. The method of arriving at final quantities is crude when compared with methods now becoming available, but Nello Teer, the contractor, has expressed satisfaction with the results.

Now numerous methods are being perfected for taking earthwork quantities directly from aerial photographs without an intermediate step of map preparation. Instead of stripping cross-sections from the contour map (and probably missing some significant breaks in the ground), the photogrammetrist reads spot elevations along a specified cross-profile line, just as if he were a three-man cross section party in the field.

These spot elevations are of comparable precision to field cross-section observation when the aerial photographs are taken at an altitude of 2,000 ft.

The pictures are taken in strips along the proposed route. Each exposure overlaps the previous one by 50-60% so there is double coverage of all ground points. Projection of two overlapping images in a stereoplotting instrument presents a complete three-dimensional scale model view of the ground to the operator. The instrument then is manipulated to plot a map of the terrain seen in miniature—or to measure horizontal and vertical distances between ground points. (In complete automation an electronic sensing device replaces the operator.)

The ability of the stereoplotter to measure horizontal and vertical distance between photo - model ground points is the key to simulated cross-section surveys.

Lockwood, Kessler & Bartlett, performed early tests of the method, feeding photographic cross-section notes to a Bendix G-15 computer to obtain earthwork volume figures in short order.

Two men working with a Wild A-5 stereoplotter (a Swiss make, of highest available precision) "surveyed" three 600-ft wide expressway cross-sections per hour. On the same terrain, fairly rugged with some brush, a three-man field party took 1 hr for each cross-section.

Time-savings with the computer are much more significant. Hand computation from a set of notes for 3 mi of expressway requires about 320 man-hours. Lockwood, Kessler & Bartlett types the field notes in form for computer use, runs the "instructions" through the G-15, and types up the results in 8 hr. Instructions include line and grade with accompanying templet data to complete the cross-section for end-area computations.

Whether cross-sections are taken off photographs or in the field there is promise for faster contract estimate payments through computer use.

Many a highway contractor has seen the owner's surveyors taking final cross-sections throughout the last weeks of construction—then take all winter to work up the notes. With the computer, notes can be worked up as the field surveys proceed, with almost no extra manpower use. The obvious result is faster completion of final estimates and quicker pay.

Accuracy of the computer need not be questioned. With self-checks built into the "program," the mathematics is perfect. Hence the output is as good as the survey data and the method of computing.

Method of computing is another area where the electronic computer can improve engineering. It makes little time difference whether the computer is using the average-end-area method or another method—

say the more exact prismoidal formula. The latter adds many man-hours to hand procedures; that's the principal reason it has not enjoyed general use.

Ohio's Method

The fact remains, however, that much is in non-graphic form when the foregoing computer application is made. Perhaps most notable to the experienced road contractor is the absence of the traditional cross-section sheets.

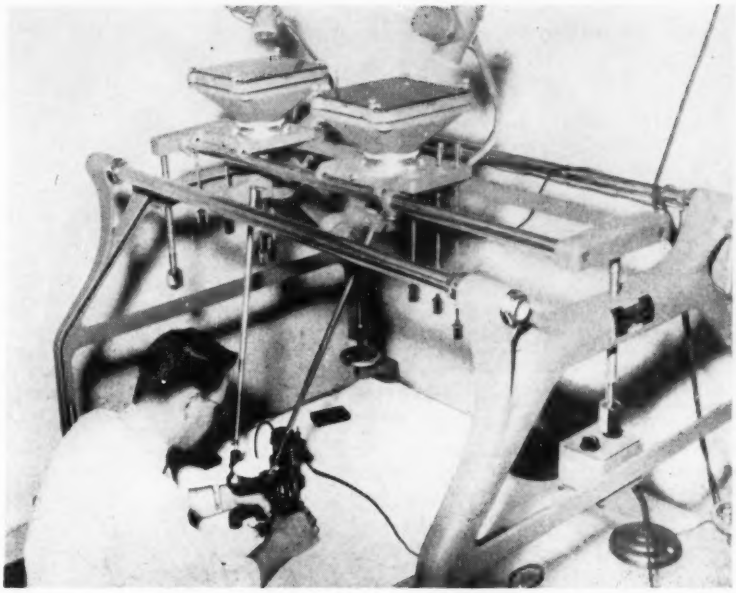
For the man who likes to see his cross-sections, an important advance ahead of the LKB technique is now being perfected by the Ohio Highway Dept. Beginning with aerial photographs, Ohio processes data through a partly automatic train that yields earthwork summaries together with graphic cross-sections photographed from a TV-type screen.

At its very beginning the Ohio method includes an innovation that has photogrammetrists talking. Instead of using a first-order stereoplotter like the Wild (about $60,000), Ohio uses an American-made Kelsh plotter (about $7,000).

Like the Wild, the Kelsh shows precise spot elevations on a dial indicator. The Wild indicates horizontal coordinates with equal precision. Horizontal measurement on the Kelsh, on the other hand, requires the intermediate step of plotting on paper and scaling the distance. There is no separate numerical indication of horizontal displacement, so plotting and scaling errors are liable to be introduced, and the cross-sectional distance "out" from the centerline might not be obtained with sufficient precision.

State engineers in Ohio have overcome the standard Kelsh's drawback by attaching a horizontal measurement bar to the plotting table. The bar is placed parallel to the desired cross-section line, the table's plotting center being set on the cross-section line. Then a micrometer screw on the guide bar drives the plotting table along the desired line. As each ground break is seen by the operator he observes the spot elevation on the regular dial. He also has his "out" distance at similar precision on the micrometer.

Now the story gets better. Instead of manually recording these data the operator presses a button which sends a printed impulse to an IBM 526 card punchout recorder coded for an IBM 650 computer. One card is prepared for each full ground cross-section.



KELSH plotter is an American instrument. Plotting table is manipulated to trace planimetry and contours. Vertical micrometer screw controls elevation readings, but addition of a horizontal guide bar is necessary to get precise horizontal measurements.

Separately, a templet card is prepared using line and grade information. This means two cards (ground and templet) for each station.

The cards are processed through the computer to obtain cumulative cut and fill volumes. Cross-section photos appear at regular intervals on a TV screen as the card pairs go through the computer, a camera photographing each plot as it appears.

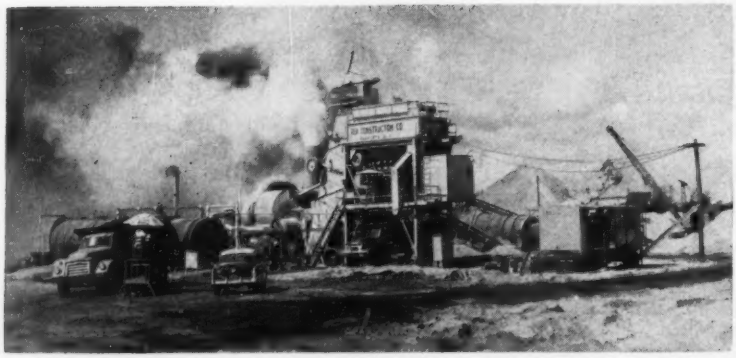
Subsequently, each cross-section is projected on a screen for examination and can be reproduced at suitable scale for field use.

Numerous states have less complex earthwork procedures in use with electronic computers made by IBM (650), Bendix (G-15), and Remington-Rand (Univac 120). Massachusetts also is adapting the IBM 650 in research on a borrow pit problem, using before and after survey data.

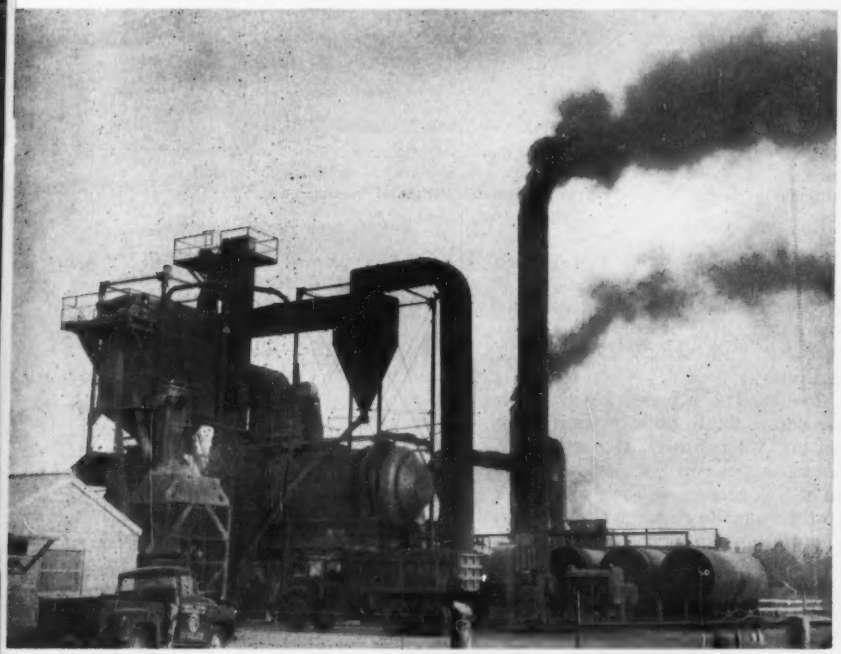
Before and after surveys will continue to be a necessity for borrow-pit measurements, but it seems likely that the so-called "Planned Quantities" method of paying for earthwork will gain growing acceptance as electronic computer applications are developed.

continued on page 344

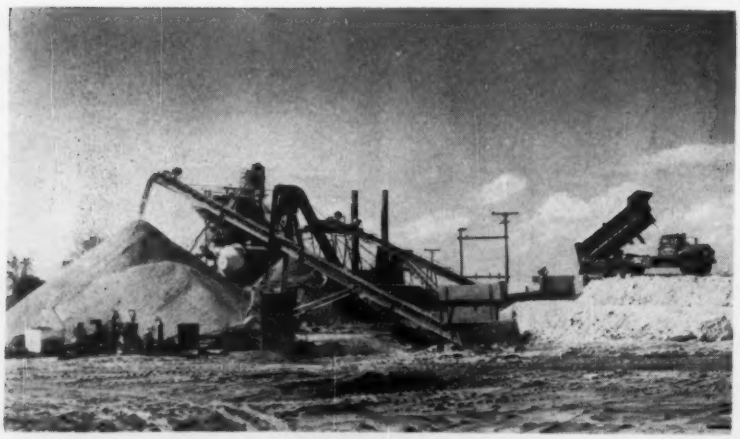
THREE-MAN CREW hauls all its equipment for a seismic subsurface investigation in a station wagon. Man at right develops seismic record in lower part of the seismograph.



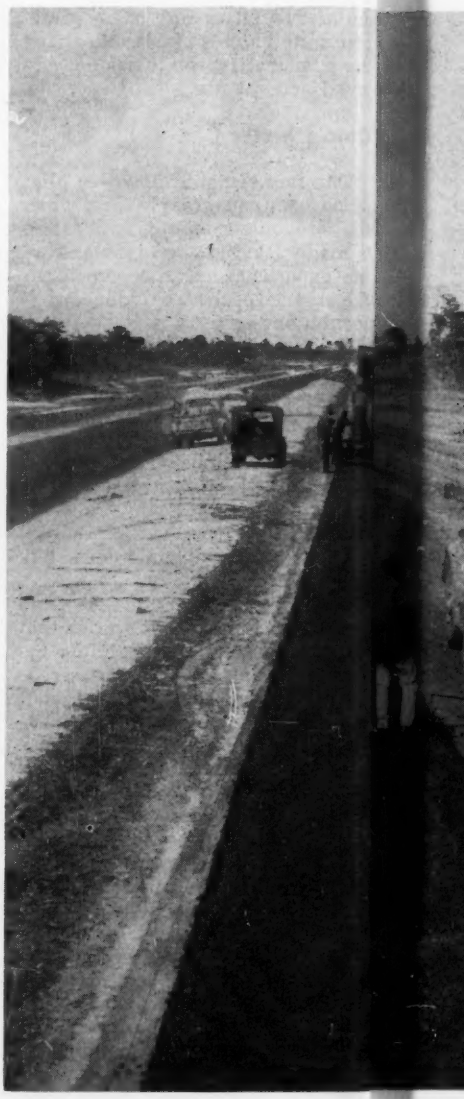
FIRST PLANT • portable Cedarapids plant is powered from generating set.



SECOND PLANT • double-shell drier on big Simplicity plant processes porous aggregates.



THIRD PLANT • conveyors build stockpiles over tunnel leading to Simplicity plant.



3 Plants

FLORIDA'S Sunshine State Parkway opens this month thanks to a whirlwind paving program. Despite a rainy fall which hampered base construction, the 108-mi bobtail turnpike from Ft. Pierce to Miami will be completed only a few weeks behind schedule.

Considering some of the difficulties of Florida roadbuilding, it's a wonder the job was completed in such a short time. A dry spring allowed some contractors to travel over areas that are generally sub-

PAVERS IN ECHELON lay 24-ft wide ribbon of asphaltic concrete binder course. Barber-Greene unit in front and Blaw-Knox rig in rear are both equipped with night-lighting lamps.

Pave Florida Pike

merged, but except for this, there were very few lucky breaks.

Competition was extremely keen, as a result of the Florida Turnpike Authority's policy of breaking the job into relatively small contract units. This allowed many local contractors to bid on the type of work in which they specialize. It also speeded construction and resulted in the lowest cost per mile of any major turnpike in the nation.

Four primary types of contracts were awarded—(1) grading and drainage; (2) bridges; (3) stabilization of roadbed and construction of limerock base; and (4) bituminous concrete paving.

Paving

Turnpike pavement consists of a 1-in. surface course of bituminous concrete on a 1½-in. binder course. Underneath, there is 8-in. of compacted limerock subbase on 12 in. of stabilized subgrade.

Except for a few short sections, the Parkway's black-top is being supplied primarily by three big asphalt plants. Unlike grading and base work in which many contractors participated, most of the eight paving contracts were picked up by three contractors.

At the north end of the 4-lane divided highway, Rea Construction Co. of Charlotte, N. C., brought in a portable Cedarapids 6,000-lb plant to supply a 32-mi stretch of paving. Rubin Construction Co. of W. Palm Beach is supplying about 32 mi at the middle of the job from its permanent Simplicity plant. And at the southern end of the job, the remaining section is being paved from a new Simplicity plant set up near a plant of Maule Industries, Inc., a producer of limerock aggregate. Contractor is Asphalt Paving Co. of Miami.

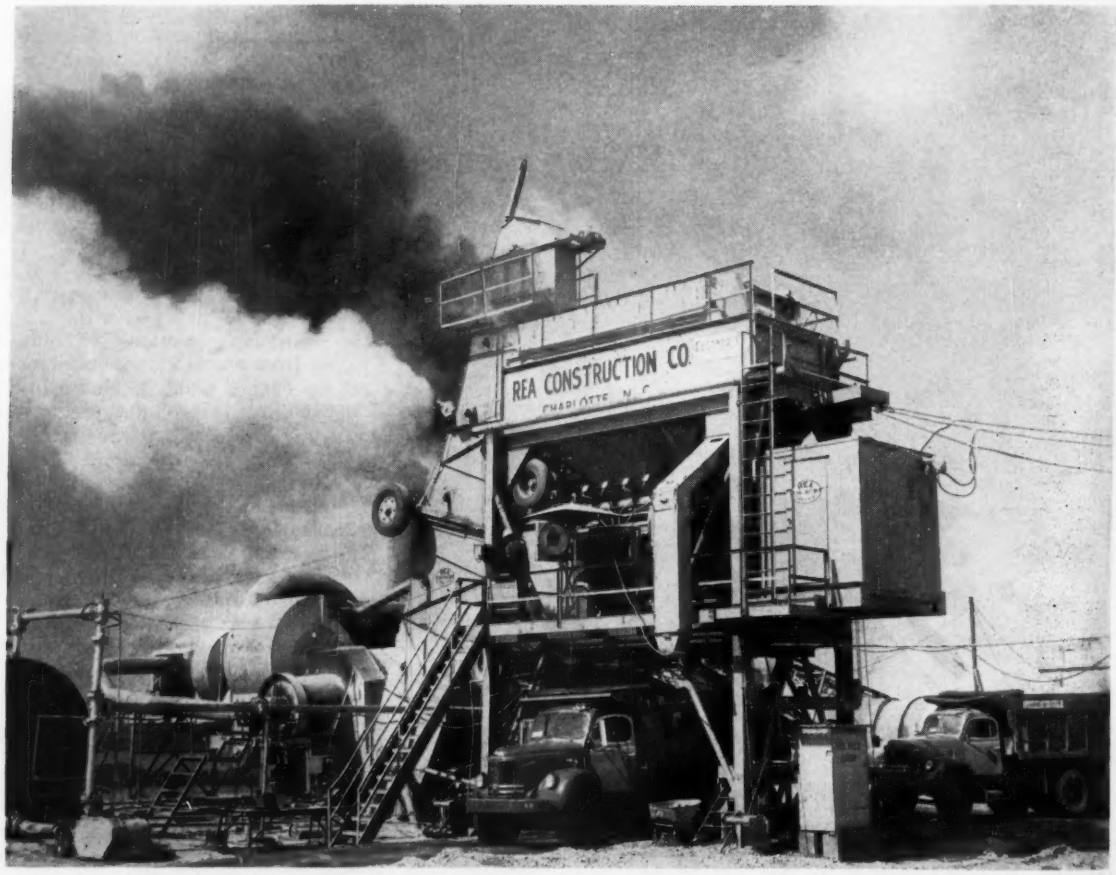
Paving costs are somewhat higher at the northern end, primarily because aggregate must be shipped 100 mi from Miami. Large quantities of acceptable aggregate in southern Flordia are found only in the Miami area. And most contractors purchase processed aggregates from commercial producers.

Portable Plant

Aggregates for Rea Construction Company's plant at the north end of the job are shipped by barge via the intercoastal waterway. Barges tie up at the plant, which is set up on the banks of the St. Lucie River near Stuart.

A Northwest clamshell unloads barges and stockpiles material. A second Northwest crane, spotted within a cluster of stockpiles.

BINDER COURSE is compacted by Galion torque-converter equipped tandem roller.



FLEET of Reo 18-ton dump trucks is kept busy by big portable asphalt plant. Automatic controls speed weighing and mixing of 6,000-lb batches. Pump (lower left) distributes hot oil to heat storage tanks, pipelines, and plant's mixing chambers.

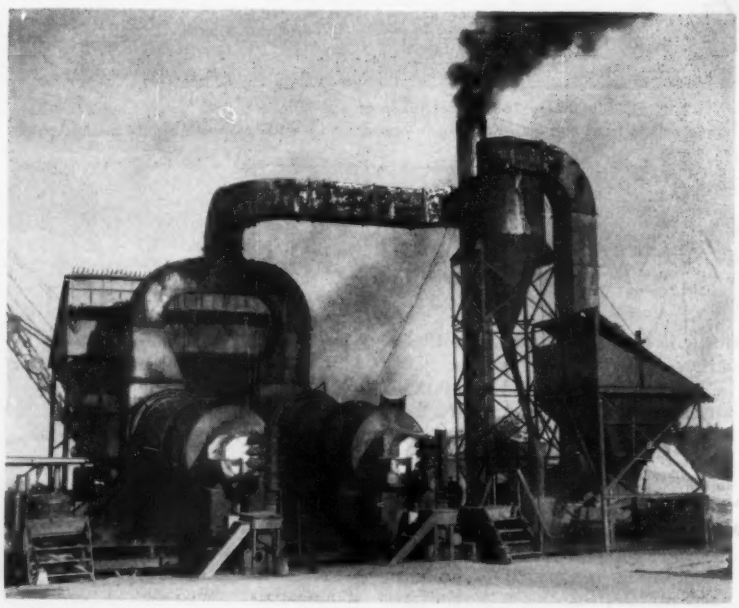
charges a cold-feed bin. When the plant is producing binder course, the bin devotes three compartments to stone and one to sand. For wearing course paving, it holds one compartment of sand, one of filler, and two of stone.

Vibrating feeders move the proper proportion of each material to a conveyor which discharges into a Pioneer drier powered by a General Motors diesel engine. The 80-in. dia drier is heated by a Hopkins double burner.

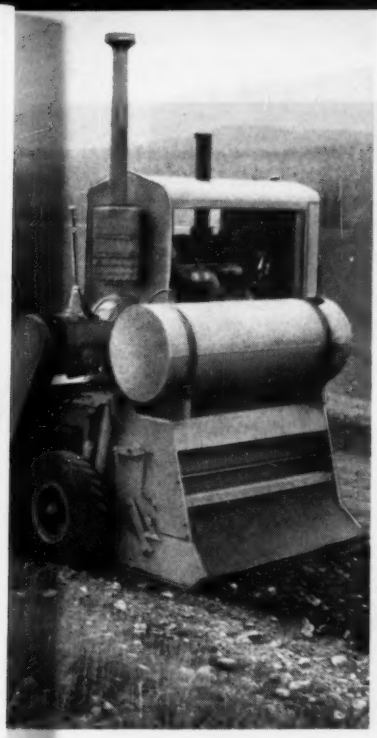
Double Drying

Heated aggregates leaving the drier are dropped on to a long exposed belt conveyor which carries them to a second drier. Limerock aggregate is so porous that it takes double drying to remove the moisture trapped in the deep voids. The first drier heats aggregate to 200 deg, and the second heats it to 325 deg.

Between the two driers, the long exposed heat-resistant belt allows



TWIN DRIERS at second plant start aggregate heating. From here, aggregates drop on to long exposed belt which allows them to give off steam before second drying.



Bros shows Road Builders 3 ways to reduce roadbed costs in '57

Subbase and subgrade materials from native or over-size rock

Montana photo (left) shows how the Bros PREPARATOR is making substantial savings on subbase costs by reducing native rock at the rate of up to 400 cu. yds. per hr. 22 special alloy steel hammers driven at high speed break rocks along cleavage lines; accepted gradation percentages and clean, sharp angles of friction result in the materials produced. Easily handles up to 24" diameter stuff. It can be towed by any 40 to 50 HP tractor.

This machine is also a real money-maker in pulverizing old blacktop materials for re-use. Reduced to uniform size, materials are easily blended with new asphalts.

Base and surface course materials mixed faster and to greater depths

Minnesota photo (center) shows the Bros ROTO-MIXER using every bit of its "beef" in mixing old road materials full of big rock, slab-like asphalts and cobblestones; heavy-duty design brought it through without damage. The machine features a 6" solid steel rotor shaft; simplified split-sleeve tool plates, load absorbing tool sockets, variable speed transmission and independent hydraulic control of the hood and the rotor.

These features add up to correct control of mixes, minimum of repair and breakdowns and deeper and faster mixes.

Earthfill materials bladed and compacted in one operation

Minnesota photo (right) shows Bros LEVEL BLADE ATTACHMENT combining grading and rolling into one operation on a regrading project. This dual effort eliminated a patrol grader from the embankment job. Consolidation allowed scrapers to run in high gear; two to three extra hauls per hour were reported. Equal or greater densities than giant tampers achieved on this project also resulted from this combination blade-roller work.

Consolidating old roadbed materials in a horizontal stockpile with the blade-roller permits scrapers to spread on top without bogging down. Spring-loaded blade has 7½" vertical adjustment for cross-overs and grading in gumbo.

• • •

Cost savings vary from job to job, but the best way to make maximum savings on roadbed construction is by putting this Bros equipment to work for you. (And don't forget about our tremendous pneumatic tired roller line.)

MAKE A NOTE TO SEE BROS IN THE AMPHITHEATRE ARENA
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SEE THE BIGGEST MONEY-MAKER AT THE ROAD SHOW

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SAND FILL washed from center island on to primed base is removed by Huber Maintainer preparatory to first paving.

FINAL base cleaning is done by Littleford sweeper and blower, powered by gasoline engine and towed by Ford pickup truck.

SURFACE COURSE of asphaltic concrete is laid by rubber-tired Blaw-Knox paver. Its big hopper and fast travel speed prove worth on high-production schedule. All contractors worked pair of pavers in echelon. Tandem rollers applied finish.

most of the moisture to escape in the form of steam. The second drier, an 88-in. dia Cedarapids, completes the process. Powered by a 75-hp electric motor, it is heated by a single Maxon burner. A Johnson-Marsh washer removes dust and sends slurry to a settling basin.

The plant itself is Cedarapids' new model G-60 featuring automatic controls and complete portability. Most of the plant is powered by a General Motors 6110 diesel-electric set. Lights and hot-oil unit are powered by a Cummins diesel-electric set.

For a heating system, the contractor turned to hot-oil. They find it simple, efficient, and unlike a steam system, requires no fresh water supply. Core of Rea's hot-oil system is a Hy-Way heater operated by an Iron-Fireman burner. By-pass valves are located so that only one of two 20,000-gal asphalt storage tanks need be heated at a time. A third tank, with a capacity of 10,000 gal, stores No. 6 bunker C fuel oil.

Aggregates leaving the second drier are carried by the hot elevator to the top of the plant where they are screened and processed. All gates are controlled automatically with air-powered cylinders.

Fast Dumping

To get maximum production, Rea

LIMA

Announcing

TWO NEW LIMAS

Here are two powerful additions to the LIMA line of power shovels, cranes, draglines and pullshovels. The Types 1250 and the 1250-SC are the carefully engineered answers to the popular demand for a high capacity shovel and a crane that will hoist concrete and steel to the top of a 24-story building.

As a standard shovel, the 1250 is equipped with a 28-foot boom, 22-foot handle and three cubic yard dipper; as a high lift shovel, with a 45-foot boom, 32-foot handle and 2½ cubic yard dipper.

The 1250-SC is designed for sky-scraping duty, a rugged machine that swings a 200-foot boom and 50-foot jib with pin point precision.

These air operated rigs are in the big-time producer class yet their design permits knock down for haulage into units of less than 60,000 pounds. Side frames and counterweight segments are removable and the gantry can be folded to a height of 12 feet, 7¼ inches for job to job transportation.

Two truck bases are available—standard and widespread as well as two lengths of crawler assemblies (standard and long). The bases are one-piece carbon steel castings, bored and bushed for through axles.

The 1250 and 1250-SC are available with diesel or electric power and with or without torque converter drive.

Get complete details on this profit-making machine from your nearby LIMA distributor, or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

BRIEF SPECIFICATIONS	Shovel	Dragline	1250 Crane	1250-SC Crane
Rating	3 yds.	.....	85 tons	100 tons
Crawler length	16′-5″	20′-7½″	20′-7½″	20′-7½″
Crawler width (32-in. treads)	13′-5″	13′-5″	13′-5″	16′-0″
(42-in. treads)	14′-3″	14′-3″	14′-3″	16′-10″
Cab width	10′-6″	10′-6″	10′-6″	10′-6″
Cab height	12′-7¼″	12′-9¼″	12′-9¼″	12′-9¼″
Rear end tail swing	15′-8″	15′-8″ & 17′-1″	15′-8″ & 17′-1″	17′-1″
Gantry height (folded)	14′-1¼″	14′-3¼″	14′-3¼″	14′-3¼″
Gantry height (working)	14′-1¼″	23′-10″	22′-1″	22′-1″ & 28′-9″
Boom length	28′ & 45′	110′	60′ to 150′	100′ to 200′
Handle length	22′-9½″ & 32′-9¼″	.....	.....	.....
Jib length	.....	.....	20′ to 50′	30′ to 50′
Boom length, including jib	.....	.....	200′	250′

COMPARE LIMA QUALITY . . . features and available equipment:

- *Independent propel*
- *Load-lowering device*
- *Extra high-speed hoist attachment*
- *Third drum*
- *Power-reversing hoist drum*
- *Heavy-duty and special lightweight booms*
- *Telescopic boom stop with automatic shutoff*
- *Steering controlled by gear-type jaw clutches*
- *Electric lighting equipment*
- *Torque converter drive*
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QUALITY CONSTRUCTION

One-piece carbon steel rotating truck base . . . fabricated steel machinery frames . . . machine-cut gears . . . heat-treated steel ground shafting . . . large diameter clutches and brakes.

THE LIMA LINE INCLUDES:

SHOVELS	CRANES	DRAGLINES	PULLSHOVELS
to 6 cu. yds.	to 110 tons	variable	½ to 2½ cu. yds.

Smaller machines available on rubber

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DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA SHOVELS · CRANES

BALDWIN-LIMA-HAMILTON

TYPES 1250 *and* 1250-SC

3 CU. YD. HEAVY-DUTY SHOVEL

HIGH-CAPACITY DRAGLINE

85 TON CRANE AT 13′ RADIUS

100 TON CAPACITY ON 60′ BOOM AT 13′ RADIUS

18 TON CAPACITY ON 200′ BOOM AT 50′ RADIUS

LIMA

Announcing

TWO NEW LIMAS

Here are two powerful additions to the LIMA line of power shovels, cranes, draglines and pullshovels. The Types 1250 and the 1250-SC are the carefully engineered answers to the popular demand for a high capacity shovel and a crane that will hoist concrete and steel to the top of a 24-story building.

As a standard shovel, the 1250 is equipped with a 28-foot boom, 22-foot handle and three cubic yard dipper; as a high lift shovel, with a 45-foot boom, 32-foot handle and 2½ cubic yard dipper.

The 1250-SC is designed for sky-scraping duty, a rugged machine that swings a 200-foot boom and 50-foot jib with pin point precision.

These air operated rigs are in the big-time producer class yet their design permits knock down for haulage into units of less than 60,000 pounds. Side frames and counterweight segments are removable and the gantry can be folded to a height of 12 feet, 7¼ inches for job to job transportation.

Two truck bases are available—standard and widespread as well as two lengths of crawler assemblies (standard and long). The bases are one-piece carbon steel castings, bored and bushed for through axles.

The 1250 and 1250-SC are available with diesel or electric power and with or without torque converter drive.

Get complete details on this profit-making machine from your nearby LIMA distributor, or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

BRIEF SPECIFICATIONS	Shovel	Dragline	1250 Crane	1250-SC Crane
Rating	3 yds.	.....	85 tons	100 tons
Crawler length	16′-5″	20′-7½″	20′-7½″	20′-7½″
Crawler width (32-in. treads)	13′-5″	13′-5″	13′-5″	16′-0″
Crawler width (42-in. treads)	14′-3″	14′-3″	14′-3″	16′-10″
Cab width	10′-6″	10′-6″	10′-6″	10′-6″
Cab height	12′-7¼″	12′-9¼″	12′-9¼″	12′-9¼″
Rear end tail swing	15′-8″	15′-8″ & 17′-1″	15′-8″ & 17′-1″	17′-1″
Gantry height (folded)	14′-1¼″	14′-3¼″	14′-3¼″	14′-3¼″
Gantry height (working)	14′-1¼″	23′-10″	22′-1″	22′-1″ & 28′-9″
Boom length	28′ & 45′	110′	60′ to 150′	100′ to 200′
Handle length	22′-9½″ & 32′-9¼″	.....	.....	.....
Jib length	.....	.....	20′ to 50′	30′ to 50′
Boom length, including jib	.....	.....	200′	250′

COMPARE LIMA QUALITY . . . features and available equipment:

- *Independent propel*
- *Load-lowering device*
- *Extra high-speed hoist attachment*
- *Third drum*
- *Power-reversing hoist drum*
- *Heavy-duty and special lightweight booms*
- *Telescopic boom stop with automatic shutoff*
- *Steering controlled by gear-type jaw clutches*
- *Electric lighting equipment*
- *Torque converter drive*
- *Anti-friction bearings at all important bearing points*

QUALITY CONSTRUCTION

One-piece carbon steel rotating truck base . . . fabricated steel machinery frames . . . machine-cut gears . . . heat-treated steel ground shafting . . . large diameter clutches and brakes.

THE LIMA LINE INCLUDES:

SHOVELS	CRANES	DRAGLINES	PULLSHOVELS
to 6 cu. yds.	to 110 tons	variable	½ to 2½ cu. yds.

Smaller machines available on rubber

SEE THE NEW LIMA 1250 AT THE ROAD SHOW, BOOTH 506 ARENA IN CHICAGO, JAN. 28—FEB. 2.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA SHOVELS · CRANES DRAGLINES · PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON
Construction Equipment Division — LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation Hamilton • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

TYPES 1250 *and* 1250-SC

3 CU. YD. HEAVY-DUTY SHOVEL

HIGH-CAPACITY DRAGLINE

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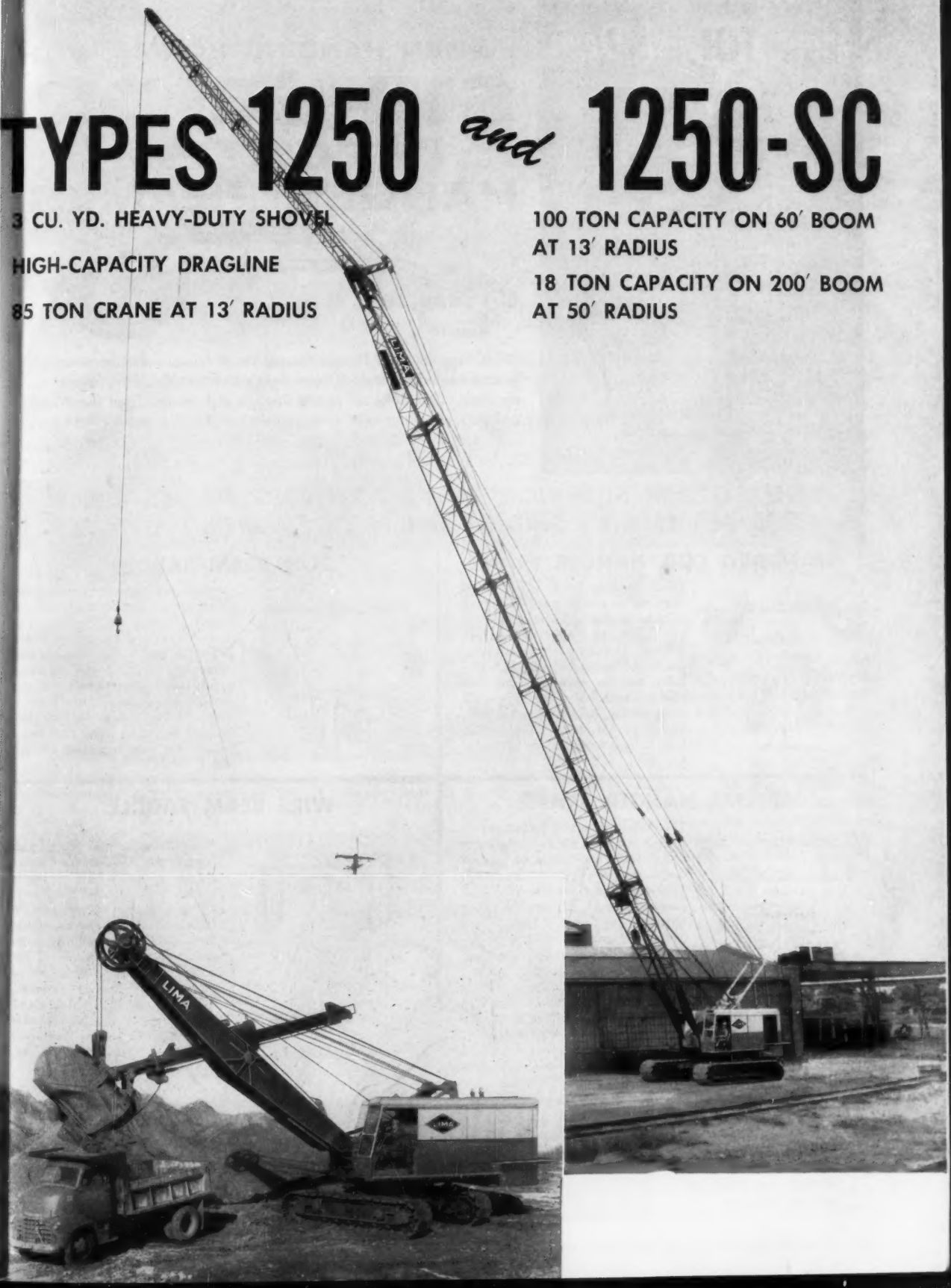
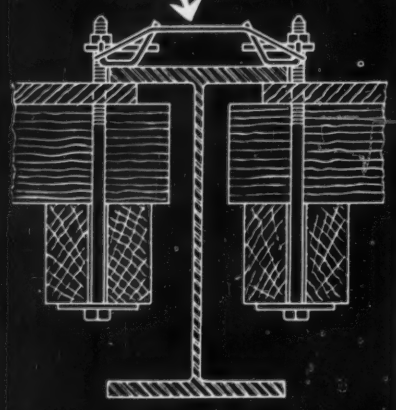


Faster Adjustment from TOP of Deck



TOTAL SAFE LOAD ON BOTH COIL BOLTS IS 10,000 LBS., OR 5,000 LBS. PER BOLT

..WHEN HANGING FORMS WITH SUPERIOR PLATE HANGER FRAMES

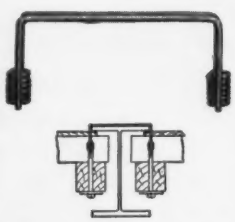
With Superior Plate Hanger Frames the installation and necessary adjustment to bring the deck forms tight against the flange are from *above* the deck. Coil Bolts are passed through and secured from above with coil nuts. Bolts are easily removed without binding because, (1) nuts are square and will not turn; (2) embedment of the bolts in the concrete is at a minimum since the plate is only ½" above the flange.

FOUR OTHER SUPERIOR WAYS TO HANG FORMS FROM STEEL BEAMS AND GIRDERS ON BRIDGE SUPERSTRUCTURES

STANDARD COIL HANGER FRAME

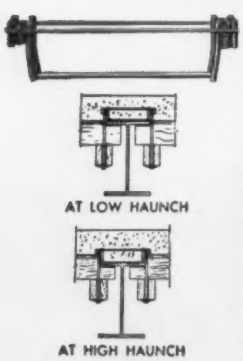
When hanging forms where specifications do not permit any hanger wire to be exposed after stripping, use Superior *Standard* Hanger Frames. Detail at left shows their use with double ledgers, ½" coil bolts, and flat washers. Total safe load on both bolts for Type 10M is 10,000 lbs., or 5,000 lbs. per bolt. For Type 6M, total safe load on both bolts is 6,000 lbs., or 3,000 lbs. per bolt.

COIL BEAM SADDLE



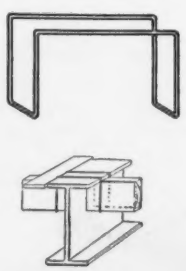
On jobs where hanger wires may be cut after stripping the forms, use Superior Coil Beam Saddles. The Coil Bolts allow for any variation in lumber and flange thickness and tightening the bolts pulls the forms tightly against the flanges. Forms are easily stripped. Safe load is 6,000 lbs. per saddle, or 3,000 lbs. for each ½" Coil Bolt. Coil Beam Saddles are also furnished for ¾" and 1" bolts.

SPECIAL HANGER FRAME



The design of certain bridge superstructures allows for the permanent deflection of the beams or girders due to the pre-calculated dead load. This deflection is compensated by a concrete haunch of varying depth on the upper flange. Superior *Special* Coil Hanger Frames were developed to meet this field condition, at the same time avoiding any exposed hanger wire. The extent to which the ½" coil Bolts are threaded into the coils allows for these varying haunch depths from maximum to zero. (See detail). Total safe load per frame is 10,000 lbs., or 5,000 lbs. per ½" bolt.

WIRE BEAM SADDLE



Wire Beam Saddles are used to hang centering joists from structural steel beams when the beams are not fireproofed with concrete. On non-fireproofed structures the load is determined by the allowable spacing of centering joists rather than the capacity of the hanger. Available in three gauges and sizes as required. Will carry safely, total loads of 2,500 lbs. to 6,000 lbs. Layouts and estimates will be sent upon receipt of plans or quantities. No obligation.

WORKING PARTS (Bolts and washers) are returnable. Layouts and estimates for Superior Hangers are available without obligation.

SUPERIOR CONCRETE ACCESSORIES, INC.

9301 King St., Franklin Park, Ill. (a Suburb of Chicago)

New York Office
1775 Broadway, New York 19, N. Y.

Pacific Coast Plant
2100 Williams St., San Leandro, Calif.

DUMP TRUCK carrying stabilizing material must be pushed through soft, poorly-graded embankment sand by Cat dozer. Marl, shell, and screening-plant sludge make good stabilizers.

TOP 12 in. of subgrade is mixed with stabilizing material. Long tines on Pettibone-Wood Preparizer mix thoroughly in one pass. Dozer follows track marks of previous pass.

WATER WAGON made from Euclid bottom-dump maintains proper moisture content and also compacts stabilized subgrade. Secondary compacting is done by smaller units.

made a few modifications in the plant. Because the aggregate is so light, they had to enlarge the weigh box so that it could handle full batches.

Rea found also that they could gain a few seconds on each batch by closing pugmill and weigh-hopper gates sooner than normal. By proper adjusting, he cut 8 sec off the pugmill closing and 3 sec off the hopper closing. This maintained the quality of the mix but speeded its processing.

At top efficiency, the plant turned out 180 tph, or about 2,000 tons per day. On previous jobs, with easier aggregate, it had hit productions of 210 tph. The plant was hauled over the road in 10 sections, including the diesel-electric-set trailer.

Hauling the mix from plant to pavers is a fleet of about twenty-four 10-wheel trucks, each carrying 18 tons of material. On the roadway, a fast-moving spread consists of one Barber-Greene and one Blaw-Knox paver, working in echelon. Following closely behind are two 12-ton Galion 2-axle tandem rollers. A 15-ton Buffalo-Springfield 3-axle tandem does final rolling of top course.

Stationary Plant

The second big plant on the turnpike is operated by Rubin Construction Co. at West Palm Beach. It is a permanent-type Simplicity S-100 with 6,000-lb batch capacity. And it has three driers to process the difficult lime rock aggregate.

A split cold-feed bin, charged by clamshell, divides the flow of aggregates and sends it through twin driers. From here, heated aggregates are dumped on to a long exposed belt where steam escapes. Final heating is achieved by a double-shell drier 10 ft in dia and 20 ft long.

Fully automatic, the big plant is powered mostly by Caterpillar and International diesel engines. Storage tanks, weigh buckets, pugmills, and other plant equipment are heated by steam.

At top efficiency, the big plant turns out better than 180 tph. Hot mix is carried by a big fleet of trucks and trailers to a team of Blaw-Knox pavers.

At the southern end of the Turnpike, another Simplicity plant is pouring out more than 180 tph. Also a model S-100, the big plant is equipped with two double-shell driers. Operated by Asphalt Pav-

ing Co. of Miami, the plant features a reclaiming-tunnel system for proportioning and feeding aggregate to the driers. Aggregate is hauled by truck from a plant nearby, dumped into hoppers, and fed to stockpiling conveyors.

On the roadway, mix is laid by two Blaw-Knox pavers.

Roadway Stabilization

One of the biggest bottlenecks in the fight to complete the Turnpike on time was roadway stabilizing and base construction. It was a tough job. Besides the rainy weather this fall, contractors were hampered by extremely difficult embankment material.

Borrow in southern Florida is a poorly-graded sugar-type sand offering virtually no stability. Highway dump trucks carrying stabilizing material over embankments almost always had to be pushed to spreading areas.

Finding the right stabilizing material offered no great problems. In some areas marl or shell material did the job. And at other points, especially near commercial centers, contractors employed the waste sludge that aggregate producers stockpile at their plants.

When a sufficiently large area was covered with stabilizing material, contractors brought in mixing machines to process the top 12 in. of subgrade. Water trucks maintained the proper moisture content while rollers did the compacting. Several types of rollers were employed, including vibratory and rubber-tired units.

Lime Rock Base

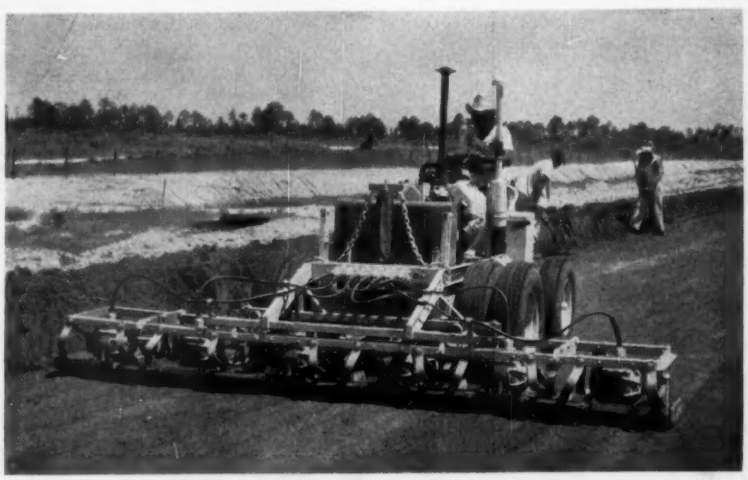
Above the stabilized base was placed an 8-in. layer of compacted lime rock base. Some contractors purchased the material from commercial producers, but others quarried their own.

Lime rock, generally, is quarried in two ways. Above the water table, it is scraped loose by a V-shaped toothed blade mounted on the dozer arms of a crawler tractor. A shoe underneath limits the blades cut to about 4 in. A dozer follows closely behind to push the loose rock into piles.

When water begins to fill the pit, scraping operations are suspended, and the lime rock is drilled, blasted, and removed by dragline.

On the roadway, most contractors used Jersey spreaders to lay the base material in two 4-in. lifts. Three-wheel steel rollers compact-

WOBBLE-WHEEL rubber-tired compactor pulled by utility tractor does final rolling of subgrade. Fast-moving equipment combination does quick job of preparing grade for base.

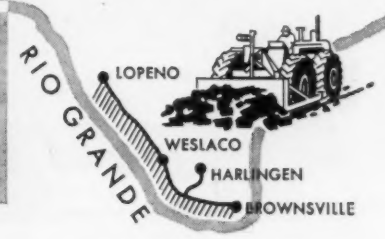


ESSICK steel-wheel vibratory roller is towed over subgrade by Cat D4 tractor. With gasoline engine mounted on frame, vibrating unit penetrates deeply in granular soils.

SELF-PROPELLED Jackson vibrating machine makes wide pass over subgrade. Six shoes are vibrated electrically. Rigs sometimes work in echelon to cover full width at once.

Operator Luis Moody blades good-sized load up 3-to-1 slope to levee. Boundary commission uses its Tournatractor extensively for fast, regular maintenance of levees on 256-mile border system.

The Rio Grande valley is a rich agricultural area, growing citrus fruits, cotton, and vegetables. Subject to flood-producing downpours in spring, and infrequent rain the rest of the year, the district depends on the levee system to provide flood protection. The IB&WC — a joint agency of the U.S. and Mexican governments — maintains levees on either side of the river. The present system of earthworks, built 15 years ago, has proved adequate to hold the Rio Grande within bounds. The Harlingen district maintains a 256-mile section, shown by slant-line area below, from the Gulf of Mexico to Lopeno.



Tournatractor speeds maintenance on Rio Grande levee system

In the fertile Rio Grande valley in southeast Texas, the U.S. section of the International Boundary and Water Commission is responsible for the upkeep of 256 miles of earth-levees. These levees, mostly 9′ to 12′ high (some as high as 20′), need constant attention. Their 3-to-1 slopes must be dozed on a regular schedule to insure protection against Rio Grande floods.

The general supervisor for the International Boundary and Water Commission at Harlingen, Texas, says the IB&WC finds their LeTourneau-Westinghouse tractor a valuable general maintenance machine. It works efficiently in all workable materials.

"Gets around fast"

A spokesman for the IB&WC stated: "The Tournatractor will get around fast. Its ability to go from place to place under its own power is important on these scattered maintenance jobs."

40 sec. cycle on 3-to-1 slope

In light dozing work on a typical 3-to-1 slope, Tournatractor completed 120′ push-and-return cycles in an average of 40 sec. each — 20 sec. forward and 20 to return and reposition for the next pass. The dozing distance was 60′ — 20′ on level ground and 40′ on slope.

Moves fast in emergencies

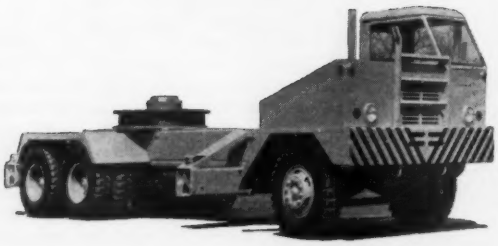
The commission depends on Tournatractor's speed in any work emergency. After heavy rains, for example, the rubber-tired dozer hurries to the site of eroded levees or washed-out access roads at high speed. On arrival, rig efficiently performs necessary repairs, reshapes eroded slopes.

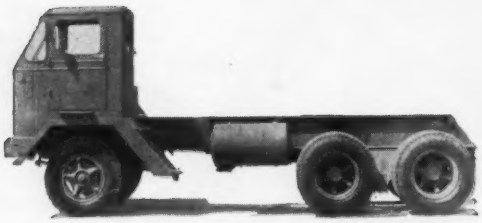
Tournatractor power, speed, and maneuverability can be put to work profitably on *your* job, too. Ask us for complete specifications and other owner-verified reports on Tournatractor operation.

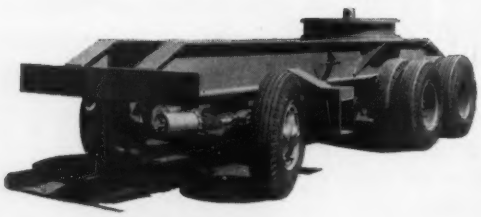
Tournatractor clears sand-drifts from base of old irrigation dam. The dam, part of an older flood-control system, now obsolete, will eventually be buried under a new levee bank.

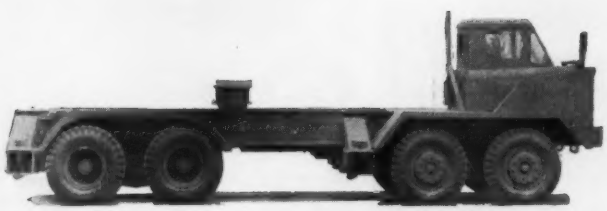
Tournatractor—Trademark Reg. U.S. Pat. Off. T-1053-A-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company
WHERE QUALITY IS A HABIT









HENDRICKSON Mfg. Co.

CRANE CARRIERS*

Hendrickson Crane Carriers are offered in the widest range of sizes and models . . .

- **For cranes and shovels from 10 to 45 tons . . .**
- **4–6–8 wheelers**
- **Gasoline–diesel–propane–or self-propelled**

Each carrier is especially designed for the specific upper works, and built to the crane manufacturer's specifications.

For best results . . . specify

HENDRICKSON

Crane Carriers for your next machines.

HENDRICKSON MFG. CO.
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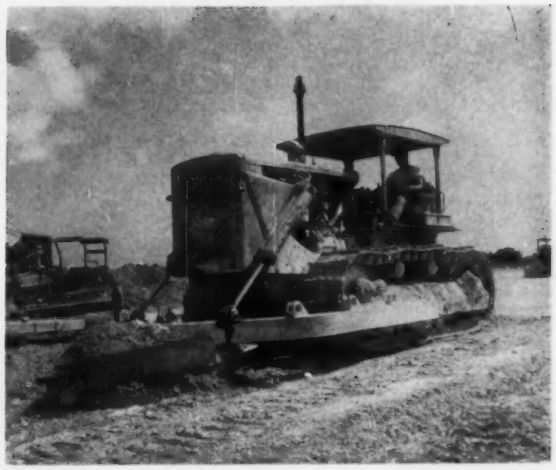
LYONS (Chicago Suburb), ILLINOIS

*Equipped with the famous Hendrickson Tandem Suspensions, the standard of truck, tractor and trailer builders and operators who want the best.

Double Drive Six Wheel Truck
Trailing Axle Six Wheel Truck
Double Drive Six Wheel Tractor
Trailing Axle Six Wheel "Pusher Type" Tractor
Tandem Axle Semi-Trailer
Six or Eight Wheel Full Trailer
Portable Special Machinery
Six Wheel Crane Carrier
Eight Wheeler
Eight Wheel Tractor and Eight Wheel Semi-Trailer

TOOTHED FRAME mounted on dozer arms of tractor is popular tool for scraping lime rock in quarries. Shoe prevents teeth from taking bite deeper than 4 in. Dozer follows to push loose material into piles. When pit reaches water level, rock is shot.



LIME ROCK BASE is laid in two 4-in. lifts by Jersey spreader mounted on Cat tractor. Compacted lime rock resembles concrete.

SURFACE of 8-in. base is shaved to exact grade by Cat grader and rolled by pair of 3-wheel rollers. Base is seal coated.

ed the material while graders shaved the surfaces to exact grade.

Seal-coat liquid then was sprayed on by bituminous distributors, allowed to stand, and covered with sand. Strict requirements on the dryness of base before sealing plagued many contractors during the wet fall, but they kept alert and hit areas as soon as they became dry.

Turnpike grading was about as unconventional as roadbuilding can get. There were few, if any, cuts on the job. In fact, it was fill from one end to the other. About 14 million yards of sand was excavated from bordering canals and borrow pits to build the embankment.

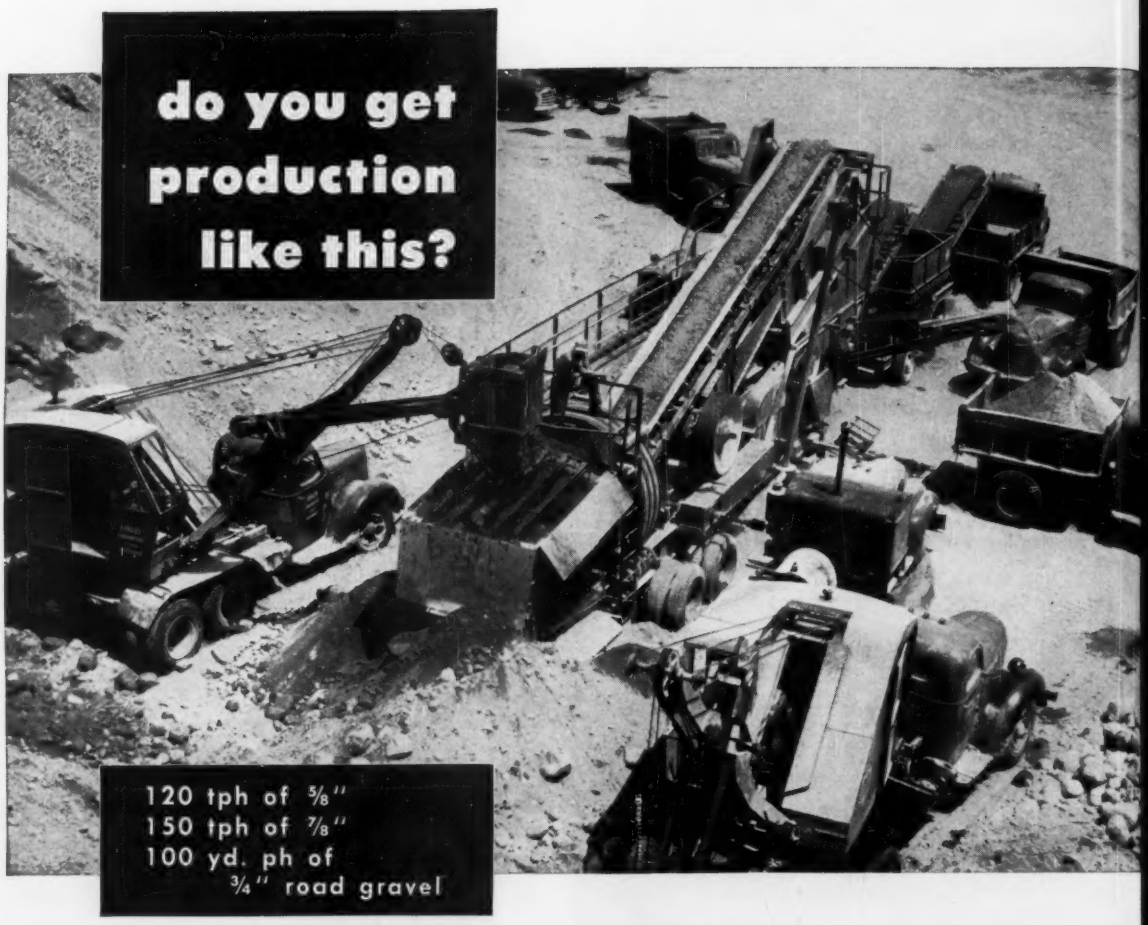
It was strictly a dragline and scraper operation. In many areas, big draglines simply traveled along the fill as they excavated straddling drainage canals and cast the material into embankments. At other points, draglines loaded scrapers and wagons for transporting and spreading. But the going was tough — especially for wagons. Four-wheel prime movers found it tough to maneuver through the unstable sand. And sometimes the bodies sank so deep that their open bottom-dump gates stuck in the material. The overhung-type scraper proved to be the best hauler.

Shallow borrow pits supplied fill in many areas, especially at interchanges where material from ditch and canal excavations was not sufficient. Scrapers handled the borrow pits, but they often worked partially submerged. After the first few feet had been removed, the pits filled with water, and many scraper operators lost sight of the lower half of their machines during loading.

Although the experiences were often unpleasant, contractors learned what accelerated construction means in that part of the country. And they should be well equipped to tackle the northern extension of the turnpike later this year.

Personnel

Howard, Needles, Tammen & Bergendoff are consulting engineers for the Florida State Turnpike Authority, which is headed by Thomas B. Manuel, Chairman, and Sam P. Turnbull, chief engineer.



"Lippmann Portable Dual Crushing Plant cannot be matched" says Ontario contractor

Glenn S. Coates, president of Fowler Construction Co., Bracebridge, Ontario, reports on the performance of their Lippmann dual portable crushing plant — a story of real output from several pits — best told in his own words:

"From the first of June to the end of December, we have crushed 91,239.3 tons and 35,501.5 yards of gravel in different locations. It can be seen that we have had considerable moving time. The time lost for moves is as small as any portable we have seen.

Our production has averaged 120 tons per hour of 5/8" materials, testing 55-60% stone, and 150 tons per hour of 7/8" materials, testing 45-50% stone. Both of these items are Government test, mainly for asphalt use. Our production of 3/4" Township road gravel, testing 50% upwards of stone, has averaged 100 yards per hour. We are pleased with the output, *as in every case it has been higher than the Lippmann people estimated.*

We consider our plant the largest portable plant in one unit in the Province of Ontario. The 12" x 36" jaw, and 40" x 20" rolls with the 4' x 12' screen and 30" belts throughout cannot be matched in one unit by any other make.

Our production figures *are not overstated, or based on our best day's run.* They are taken on average from many pits and conditions and in very few cases were there any days with lower amount than those quoted herein.

The plant maintenance on the Lippmann is, we believe, as low or lower than any plant crushing under similar conditions. We have no hesitation in recommending the Lippmann equipment to any prospective purchasers and we will frankly discuss its merits with anyone referred to us."

Owners of Lippmann Portable Crushin plants cite other reasons why they lik their Lippmann plants, such as the ba ance between all the components th eliminates lost motion and saves powe . . . the good stability and arrangemen that makes them so mobile . . . the fac that they require no blocking or jackin for quick and easy set-up. Also men tioned is the exceptional performance o the individual components, such as th famous Grizzly King or Rock Ram jaw crushers, superior roll crusher secon daries, Screen-All screens and Ever-Se conveyor idlers that never need greasing

Those who want to know more about th kind of performance Lippmann ma chines turn out — whether it's crushers feeders, screens or complete plants — can learn by contacting a local Lippmann Dealer, or Lippmann Engineerin Works, Inc., direct at 4650 West Mitch ell Street, Milwaukee 14, Wis., U.S.A.

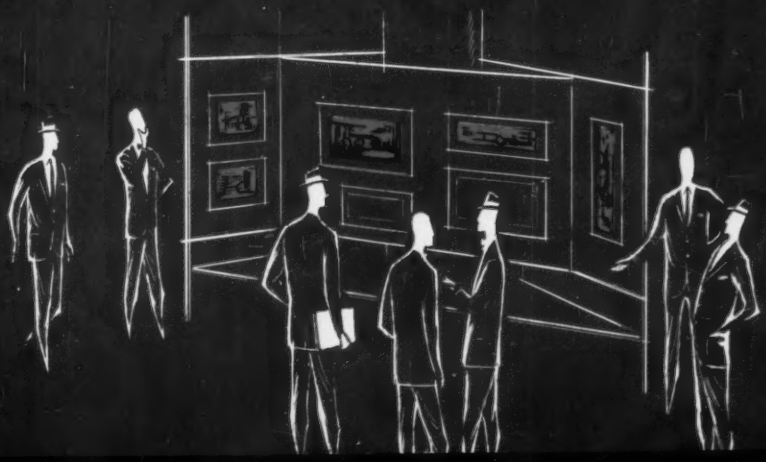
Road Show Highlights:

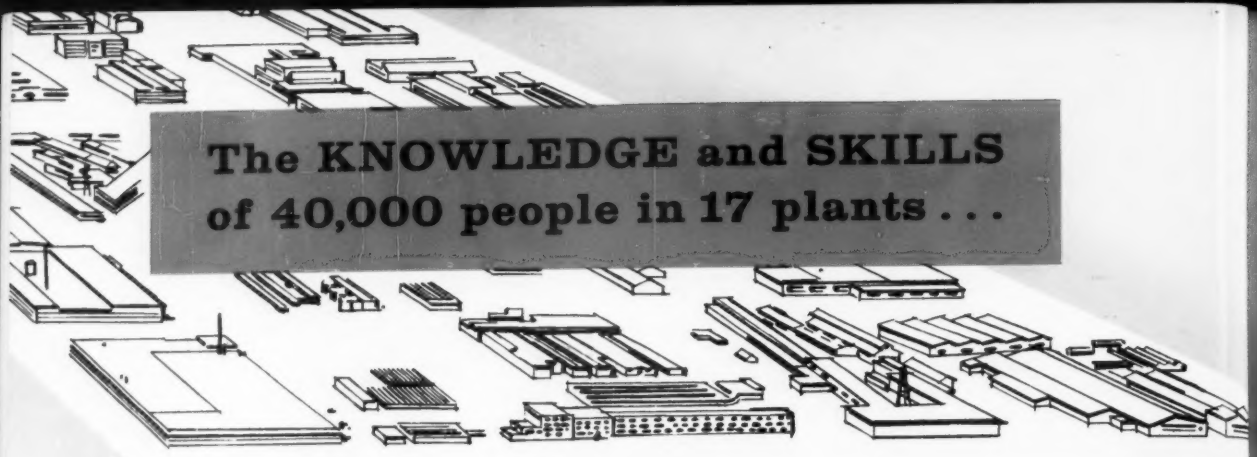
See how

ALLIS-CHALMERS

Engineering-in-Action

can help you meet the challenge of the big road-building years ahead!





The KNOWLEDGE and SKILLS of 40,000 people in 17 plants . . .

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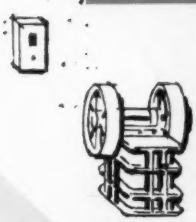
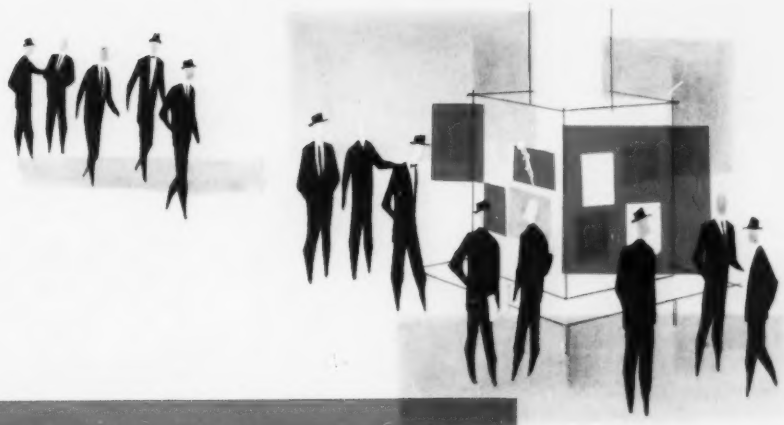


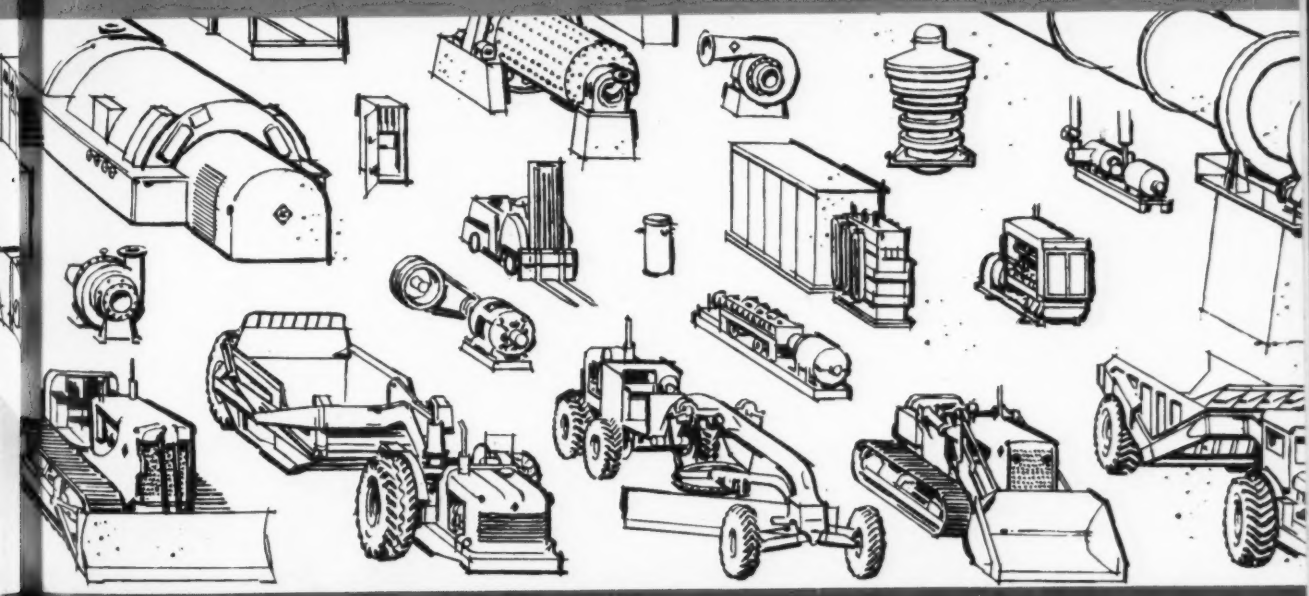
Engineering-in-Action

give YOU a complete line of adv
for pro



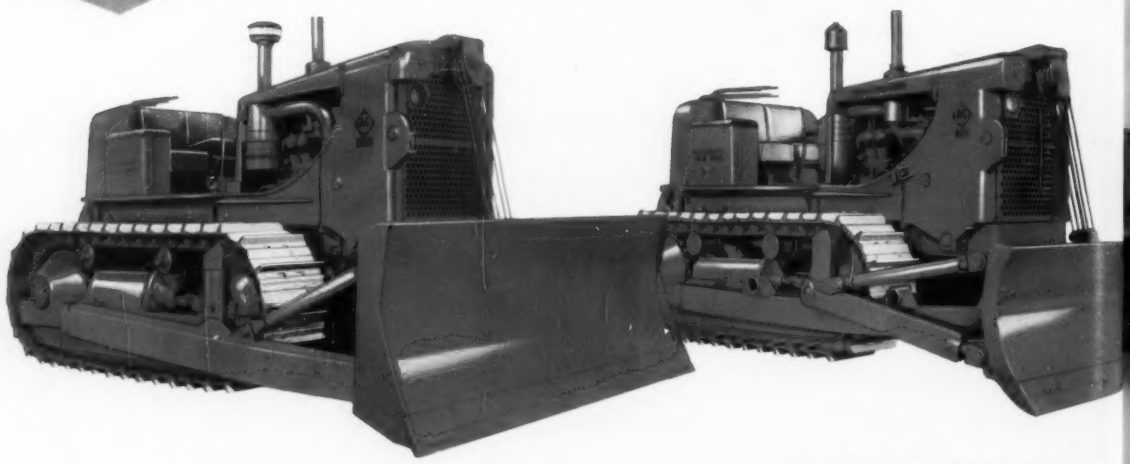
broadest facilities in
MANUFACTURING • DISTRIBUTION

EXPERIENCE gained in building more than
basic products for the world's major industries . . .



advanced-design construction machinery . . .
production and profit on the job!

Engineering-in-Action



HD-21 204 net engine hp (torque converter drive)
2 forward speeds to 7.5 mph
1 reverse speed to 5.5 mph
53,400 lb (approx. as shown)

HD-16 150 net engine hp (torque converter drive)
3 forward speeds to 7.2 mph
2 reverse speeds to 5.5 mph
141 belt hp (standard transmission)
6 forward speeds to 5.8 mph
3 reverse speeds to 4.5 mph
38,200 lb (approx. as shown)

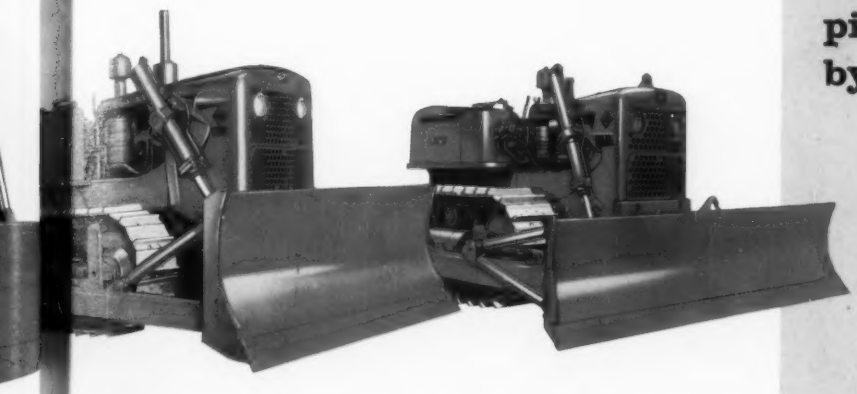
4-cu-yd HD-21G 204 net engine hp (torque converter drive)
13-ft, 4-in. dump height
66,500 lb

3-cu-yd HD-16G 150 net engine hp (torque converter drive)
12-ft, 3-in. dump height
47,800 lb

Model 315 Struck—15 yd
Heaped—20 yd
Cable control
25,850 lb

Model 108 Struck—8.4 yd
Heaped—11 yd
Cable control
15,250 lb

FOR PRODUCTION AND PROFIT ON THE JOB

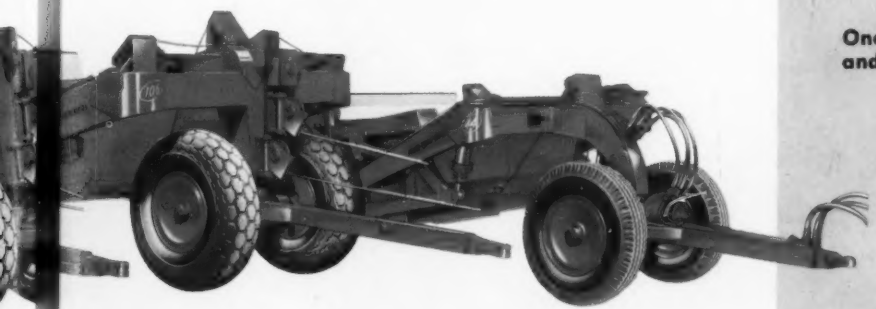


HD-11 — 94 belt hp
6 forward speeds to 5.7 mph
3 reverse speeds to 4.4 mph
24,600 lb (approx. as shown)

HD-6 — 63 belt hp
5 forward speeds to 5.5 mph
1 reverse speed to 2.0 mph
15,850 lb (approx. as shown)

2¼-cu-yd HD-11G — 111 net engine hp, 11-ft, 7-in. dump height, 32,000 lb

1½-cu-yd HD-6G — 72 net engine hp, 10-ft dump height, 19,600 lb



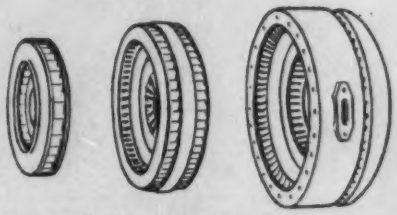
Model 106 — Struck—6.1 yd, Heaped—7.5 yd, Cable control, 10,300 lb

Model 44 — Struck—4 yd, Heaped—4.7 yd, Hydraulic control, 6,595 lb

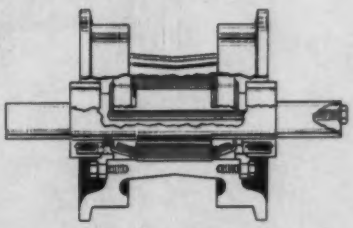
Examples of Engineering in Action

ADVANTAGES

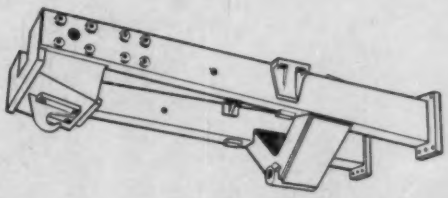
pioneered and proved by Allis-Chalmers



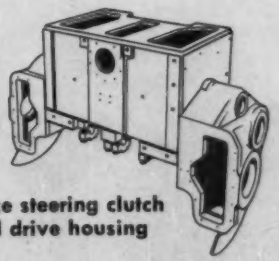
Torque converter drive



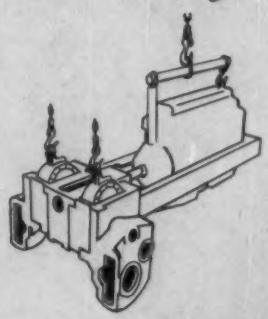
1,000-hour lubrication intervals



All-steel Box-A main frame



One-piece steering clutch and final drive housing



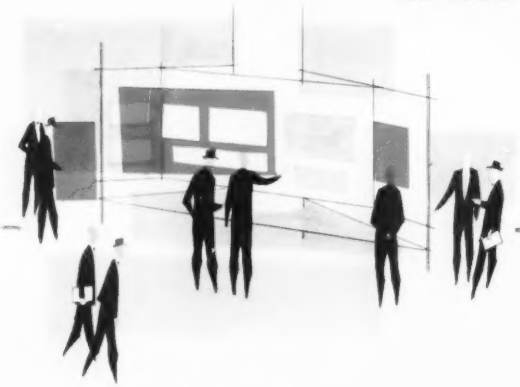
Unit construction

Engineering-in-Action FORC

TS-360
280 hp
Struck—15 yd
Heaped—20 yd
Speeds—to 20.0 mph
Weight—49,050 lb
(approx.)

TS-260
200 hp
Struck—11 yd
Heaped—14 yd
Speeds—to 20.0 mph
Weight—39,600 lb
(approx.)

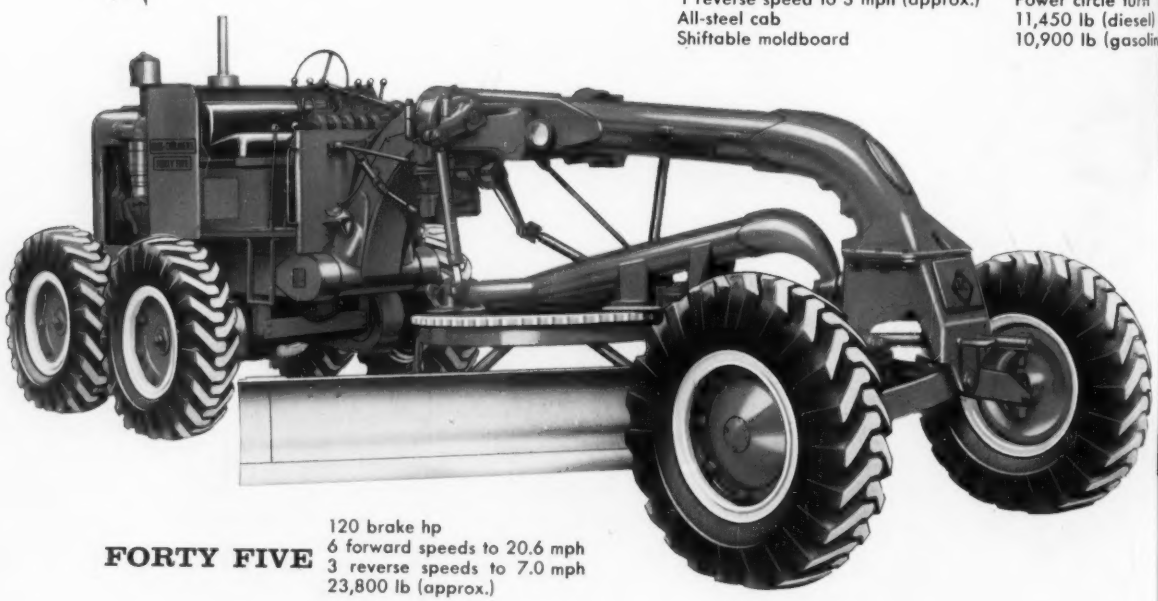
TW-360
Struck—17 yd
Heaped—22 yd
Tons—26
Weight—47,000
(approx.)



Model D Special

50 brake hp, gasoline or diesel engine
4 forward speeds to 25 mph (approx.)
1 reverse speed to 3 mph (approx.)
All-steel cab
Shiftable moldboard

Hydraulic scarifier
Leaning front whee
Power circle turn
11,450 lb (diesel)
10,900 lb (gasolin

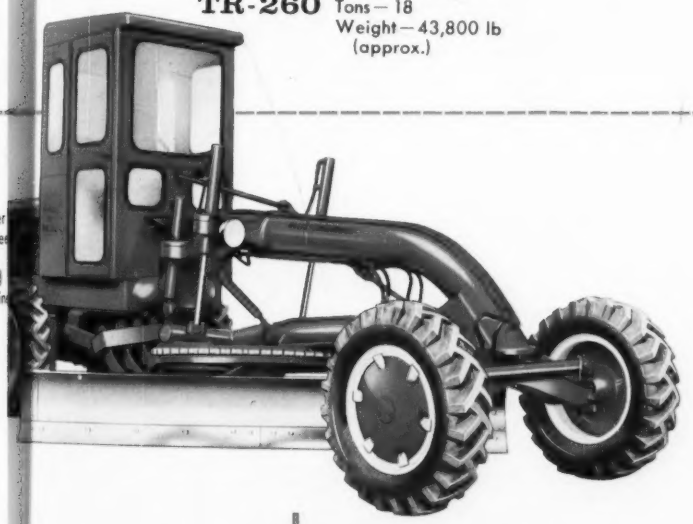


FORTY FIVE
120 brake hp
6 forward speeds to 20.6 mph
3 reverse speeds to 7.0 mph
23,800 lb (approx.)

ROLL-AWAY is an Allis-Chalmers trade mar

FOR PRODUCTION AND PROFIT ON THE JOB

TR-260 Struck—11 yd
Heaped—15 yd
Tons—18
Weight—43,800 lb
(approx.)

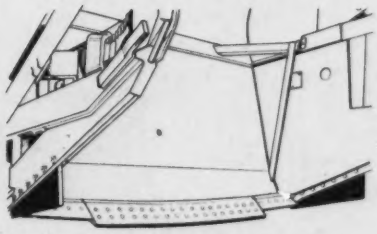


Model D Standard and Rear-End Loader 8,800 lb (gasoline)
9,350 lb (diesel)
⅜-cu-yd bucket—
hydraulically controlled
Loader—2,200 lb
(approx.)

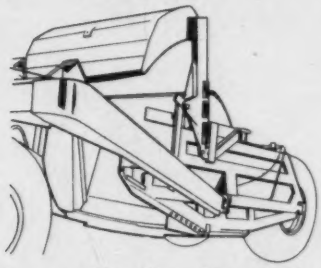
Examples of Engineering in Action

ADVANTAGES

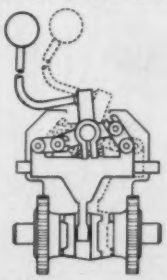
pioneered and proved by Allis-Chalmers



Curved bowl bottom and offset cutting edge

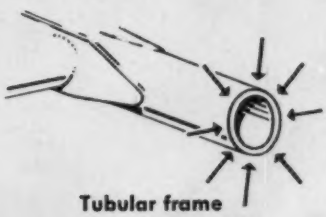


High apron lift and positive ejection



Toggle-type control

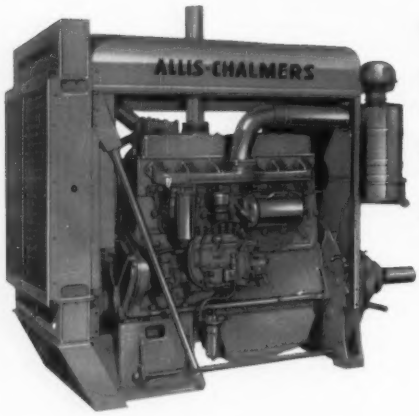
ROLL-AWAY moldboard



Tubular frame

Engineering-in-Actio

FOR PRODUCTION AND PROFIT ON THE JOB



Power Units

D-153 Diesel
35 max. brake hp @ 1800 rpm

D-230 Diesel
53 max. brake hp @ 1800 rpm

B-125 Gasoline
28 max. brake hp @ 1800 rpm

D-779 Diesel
160 max. brake hp @ 1800 rpm

D-844 Diesel
189 max. brake hp @ 1800 rpm

DS-844 Diese
243 max. brake hp @ 180

Wheel Tractors

Model IB
22.87 belt hp

Model WD-45
45 belt hp

TRUE ORIGINAL PARTS AND SERVICE

Your Allis-Chalmers construction machinery dealer offers you the benefits of factory-trained, well-qualified men to provide fast, expert service on your equipment and keep it working at designed capacity. He stocks only *True Original Parts*, engineered right, manufactured right, to perform right . . . help you take full advantage of the big road-building years ahead.

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ALLIS-CHALMERS

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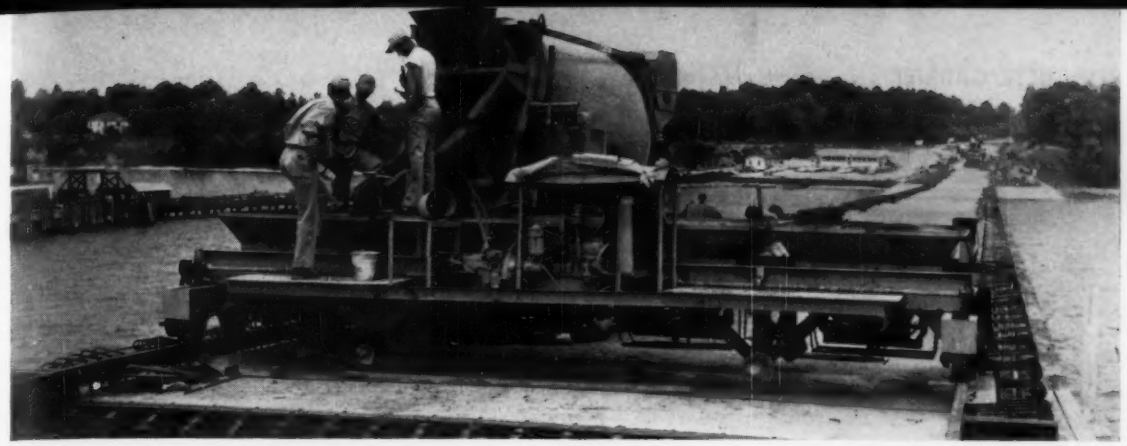

CONCRETE is chuted from Rex ready-mix truck (top) into one of four 1-yd hoppers mounted on contractor-made self-propelled carrier. At pour (bottom), concrete is dumped and operator returns carrier for next load. Rig pays off on skip pouring.

Concrete Carrier Paves Bridge Deck

A CONTRACTOR-MADE concrete carrier is cutting deck paving costs on Virginia's Rappahannock River Bridge. It propels itself on steel rails and hauls four yd at a time.

Ingenious contractor, Wiley N. Jackson of Roanoke, Va., developed the rig to pour 9,800 ft of 22-ft wide concrete deck. He needed something special, because the superstructure's hung-span design required skip-pouring along most of the bridge, and conventional methods were ruled out. A floating concrete plant would be too expensive, and it would have plenty of trouble reaching the high spans. Motorized buggies were considered but they would not only increase labor but also require long runways. In some areas, because ready-mix trucks were allowed to ride only on 28-day concrete, pours were made as far as 1,000 ft from the trucks.

Carrier On Rails

To meet these tough conditions, Jackson developed his own rig. Driven by a General Motors engine, the 15-ton carrier rides on 6-in. rails supported by 2-in. pipes welded 6 ft apart on the top flanges of superstructure girders. Of the four wheels on each end, two are driven by roller-chain assemblies connected to the engine. Concrete is carried in four 1-yd hoppers, made from the bottoms of buckets.

The rig's operation is simple. A ready-mix truck chutes its 4-yd load of concrete directly into the hoppers. When the carrier is loaded, the operator heads it up the bridge at a speed of about 5 mph. In a short time, straddling areas of uncompleted deck, it arrives at the point of placement. The rig is stopped, gates are opened, concrete dumps in four piles.

When the rig leaves, a finishing crew begins leveling the concrete. They first spread and consolidate the mix with a vibrator whose engine rides conveniently on one of the steel rails. A Master vibrating screed, also riding the rails, levels and floats the surface. Following closely behind, hand finishers work from aluminum bridges stretched across the rails. Final operation is spraying curing compound.

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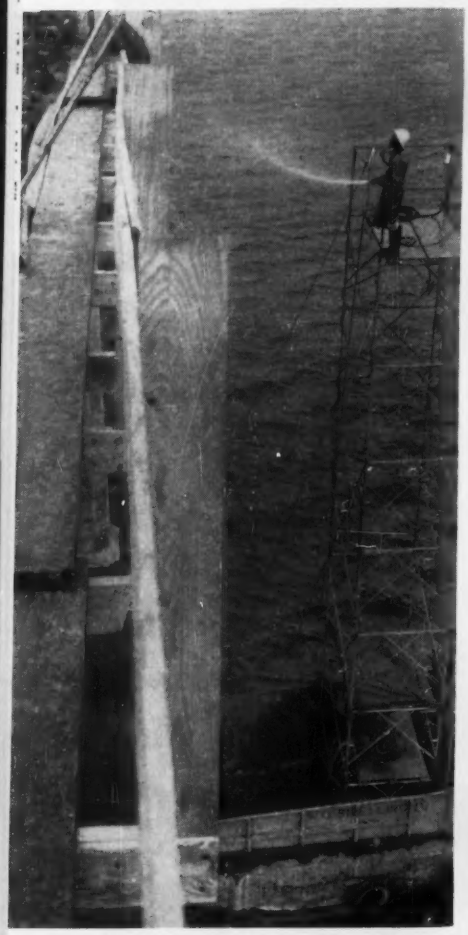
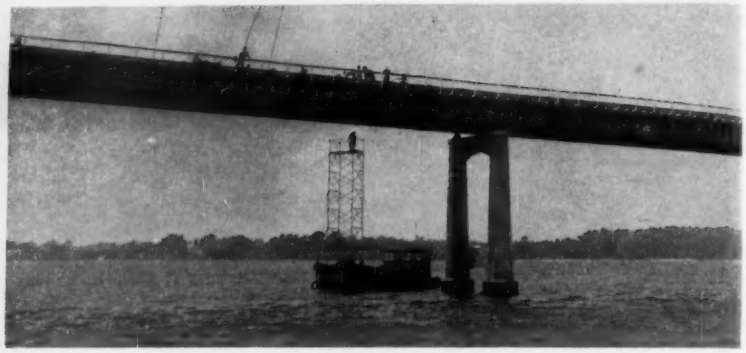


TOWER mounted in bow of converted landing craft supports man washing steel girders.



DECK PAVING progresses on bridge as LCM maneuvers underneath to allow man on tower to spray water on girders and wash concrete drippings. It's cheaper than brushing later.

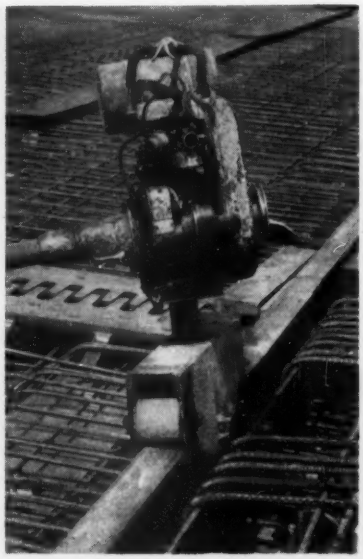
FINISHING CREW uses Master vibrating screed to complete surfacing of deck before concrete carrier returns with another load. All finishing equipment rides on rails.

When about 1,000 ft of deck are completed on one end of the bridge, Jackson moves the paving spread to the opposite end. Four rubber-tired wheels are quickly mounted on the carrier and it is towed to a ferry, hauled across the river, pulled on to the bridge, and set up for paving. Production averages 70 yd a day.

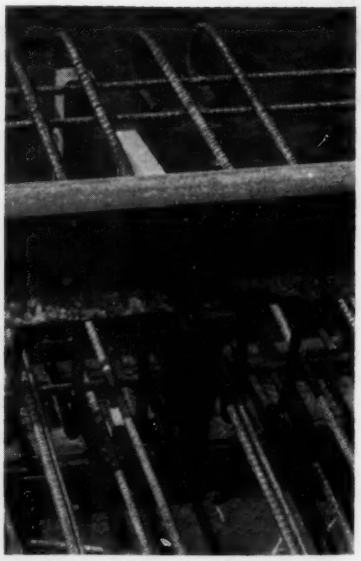
Washing Tower

Another unique device is employed by Jackson to wash concrete drippings from beams and girders under a pour. He mounts a scaffold tower on the bow of a converted LCM landing craft. Fresh water stored in the cavity of the LCM is pumped to a man atop the tower who plays a spray on the beams. It's a lot cheaper than brushing it off later.

B. W. Johnson is superintendent for the contractor, Wiley N. Jackson of Roanoke, Va.



ENGINE for concrete vibrator rides conveniently on one of two 12½-lb steel rails. Note steel expansion joint.



STEEL RAIL is supported on 2-in. pipes welded to girders. Pipes remain in concrete. Tops are 1 in. below surface.

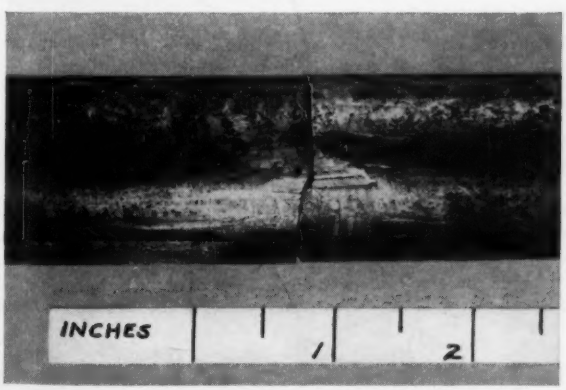
how to get the most out of HOLLOW DRILL RODS

In a modern jackhammer, hollow drill rods must take between 1800 and 2000 jolting blows per minute. It's pretty rugged treatment for *any* steel – even Crucible's special alloy CA DOUBLE DIAMOND or 4E Hollow Drill Rods. That's why it's so important that you prevent unnecessary *abuse* of drill rods on the job. Here are a few tips that may save you time and money.

Take, for example, DRILLING METHODS

ROD ALIGNMENT – A little extra care in properly aligning the drill rod so that the force of the piston is transmitted to the rock in a straight line will help reduce breakage a surprising amount. For bad alignment sets up severe stresses in the steel.

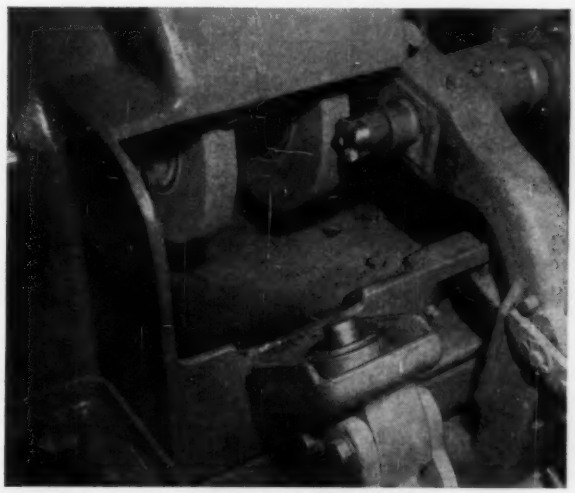
RATE OF FEED – Too slow a rate of feed forces the rod to absorb much of the impact – without a proportionate amount of hole being drilled. Too fast a rate results in a high breakage rate. Alloy rods – Crucible CA DOUBLE DIAMOND or 4E – allow faster drilling speeds than straight carbon drill rods used under the same conditions. That's because these alloy rods have higher hardness, tensile and yield strengths. The harder, more elastic alloy rod transmits the piston blow more efficiently than does the straight carbon drill rod.



Careless handling caused surface damage which resulted in a broken rod.

SURFACE DAMAGE – Damage to the surface of a drill rod may often lead to a broken rod. Nicks or deep tool marks cause stress concentration at the damaged spot.

BITS – Drilling with bits that have dull edges or gages badly worn creates a strain in the drill rod that prevents maximum efficiency. It pays big dividends to keep bits in good shape.



Sharp bits pay off in drilling efficiency.

Actually, the solution to lower drilling costs–longer drill life–is simple: First, use the *right* drill rod and, second, apply a little extra care and common sense to machine setup and operation. It's well worth the effort.

Your nearby Crucible representative can give you helpful hints on other phases of drill rod care and operation–or arrange for *prompt* delivery of hollow drill rods in the sizes, types and grades you need. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Working in the confined area of a trench, operators make rapid progress using the *Le Roi Newmatic C11 Paving Breaker* as a clay spade in exceptionally hard ground. (Shopping Center, Richmond, [illegible])

Growing usage of

Airpower

check these important air-tool facts to increase your profit margin

More contractors use air tools to speed work, reduce costs

The country's leading contractors save time, save money, by making a do the work . . . letting men use their skills. Always searching for fast more efficient, more economical construction equipment, they are maki greater use of air tools today than ever before.

The widespread use of these tools, rugged in construction and excelle in performance, is taking much of the labor out of heavy construction wor

One man, with skilled handling of a clay digger, can do the work of whole labor gang without becoming overtired — for modern equipment air-cushioned to smooth out vibration. This removes the strain of handli that was associated with air tools of earlier design.

Using an air tool, the worker acquires the status of a skilled operat taking pride in his work which is reflected in the general speed, efficien and progress of the contract.

Less fatigue — more work per man-hour

While it is accepted that wider use of air tools enables contractors to spe up work and reduce costs, it must be emphasized that care should be tak in the choice of equipment.

Certain features of air tools have a very direct bearing on the time/co saving factor. It is not simply a question of blows per minute; the degree fatigue to which the worker is subjected greatly influences the progress makes with the tool. *Air-cushioned* blows are of the first importance.

Always choose tools that have been specifically designed to reduce fatig — you will obtain more work per man-hour and have a contented work

Other factors contributing to greater efficiency and output per man-hour

In addition to air-cushioning, the worker is relieved of much fatigue if t tool he is using is correctly balanced. This is of particular importance wh working in cramped quarters, such as a trench, while using a clay digge

AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER

Le Roi Model 52 Heavy-duty Paving Breaker for tough concrete (80 lb.)

Le Roi Model C11 General-purpose Paving Breaker (60 lb.)

Le Roi Model C10 Demolition, light-duty Paving Breaker (35 lb.)

Le Roi Model 31 Clay Spade for average ground (18 lb.)

Le Roi Model C10D Clay Spade for hard ground (35 lb.)

Le Roi Model TT11 Triple Hand Tamper for all applications.

Le Roi Model 11 Tamper for all applications.

Le Roi Model 22 Sinker for utility work (17 lb.)

Le Roi Model H168 Sinker for shallow drilling (35 lb.)

Le Roi Model H111 General purpose Sinker for drilling, ground (55 lb.)

Paving breakers and drills should have the exhaust deflected away from the operator's legs. The sides of the tool should be streamlined and smooth for comfortable handling. Handgrips should remain cool, no matter how long the tool is in operation.

Sound design insures long life for tools

By the very nature of their operation, air tools are subjected to extreme and violent action. Rugged construction combined with precision engineering is essential if an air tool is to give long, efficient service with a minimum of maintenance.

Delays for unnecessary maintenance or the replacement of parts immediately affect the cost factor in relation to the contract as a whole. It pays to be sure that the tools chosen for the job match up to the following ideal standards:

Main components. The main parts of breakers, sinkers, tampers, etc., should be tough enough to stand up to the roughest use under all conditions. All parts should be heat-treated to the exact degree of hardness required for their specific purpose.

Auxiliary components. Tampers should have foil packing, clay spades an efficient bonded rubber and steel retainer. Breakers and drills should have a flow of air through the fronthead to prevent entry of dirt.

Wherever possible, bushings should be used to provide renewable wearing surfaces. On tools where these can easily be replaced, many years of life are added to the service of the equipment.

Lubrication system. The lubricating system must be efficient. Every tool should have positive shank oiling, and accurately metered oil to all moving parts.

General. Not only must the tool be balanced, and air-cushioned to assure the operator's comfort and convenience: it is equally important that the internal mechanism be finished to fine precision tolerances.

All mating surfaces should be lap-finished and leakproof to maintain perfect alignment with adjacent parts. Such minute tolerances result in less wastage of power, and lower air consumption. These factors add up to the ability to deliver smooth blows of greater power, with more comfort to the operator.

Service. All power tools, no matter how expertly manufactured, require replacement of component parts from time to time, usually due to excessive wear or mishandling.

To the busy contractor, any delay is costly, and no delay is more aggravating or needless than that caused by equipment out-of-service for lack of parts. Make certain that the manufacturer of the air tools you purchase maintains a really efficient, wide-spread service organization with well-stocked spare-parts distributors located to service your needs quickly.

30 times bigger!

Business is going to be good . . .

In the next 13 years, over 50 *billion* dollars will be spent in Federal and State matching funds on the new highway construction program . . . a project 30 times the size of the Panama Canal, Grand Coulee Dam, and the St. Lawrence Seaway all rolled into one!

Be sure that *your* share of this business is profitable by making wise use of air power and Le Roi Air Tools.

How the wise use of air tools can win more contracts for YOU

Take stock of your position today. Review your last few contracts, and answer these questions:

Am I using air power and air tools efficiently?

Would increased use of air tools have saved me time on my last job?

Would more air tools reduce the size of my working crews?

Am I using modern air tools?

Do I get good service on my air tools? Fast parts replacements?

Have I kept abreast of developments in air tools? Do I know what new ones have been introduced that I can use advantageously?

Would the increased use of air tools enable me to cut costs, and bid in lower against my competitors?

The smart contractor will make good use of the wide range of air tools available. He will utilize his manpower to skillfully handle labor-saving tools, thereby reducing labor overhead. He will seek tools and methods that will speed up the work. He will keep alert for new developments that will make airpower work for him more efficiently.

These are the airpower considerations that will place the wise contractor ahead of his competitors — that will give you an increased profit potential in every future contract.

AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER

Model H111 Heavy Duty Sinker for deep drilling, hard ground (55 lb.)

Le Roi Model DR40 Wagon Drill for deep drilling, hard ground

Le Roi Model DR34 with H10 Drill for shallow drilling in average ground (also with H23 Drill for medium drilling

Le Roi Air operated sump pump—capacities to 340 gpm, heads to 70 ft.

Le Roi Model H10AL Air leg for drifting and tunneling

Le Roi Model T286 Self-propelled dual drill rig

Le Roi one-use detachable rock bits

(CONTINUED FROM PRECEDING PAGE)

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You find all the important features for long life and top performance in Le Roi Newmatic Air tools and Equipment:

Air-cushioned to relieve operator fatigue and increase life of equipment.

Perfect balance for easy handling. Air tools specially designed to give greater comfort, produce more work per man-hour.

Rugged construction. Built to endure tough action in tough places. Components manufactured from indestructible forgings. Internal mechanism finished to fine precision tolerances.

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Nation-wide sales and service. Spare-parts distributors throughout country.

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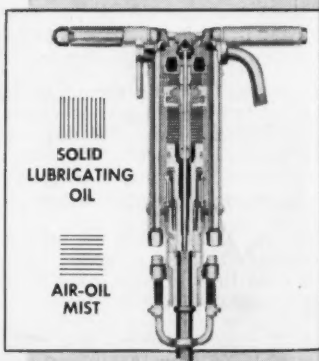

Le Roi Newmatic tools give you the sa… sure protection of a fool-proof lubricati… system. Every tool has a large oil reserv… positive shank oiling, and accurately mete… oil to all moving parts.

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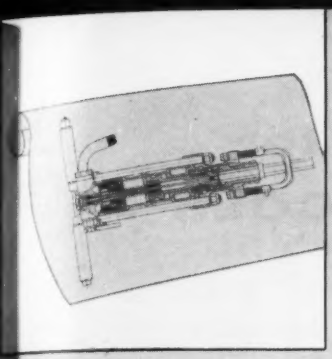

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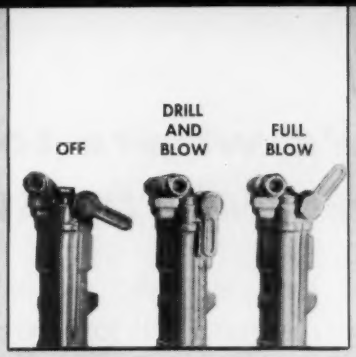

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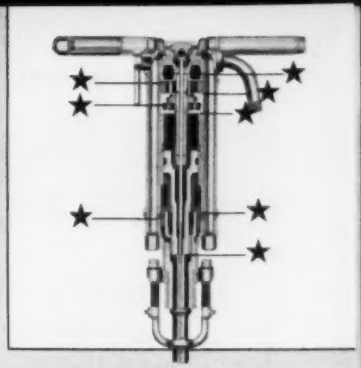

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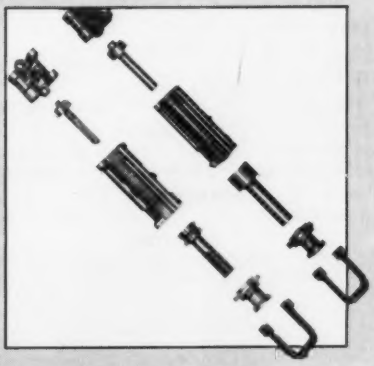

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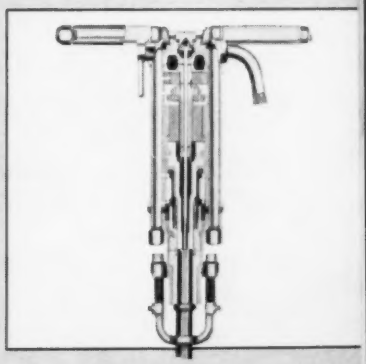

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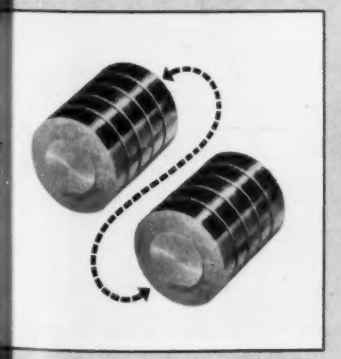

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CHATTANOOGA - Knox-Tenn Equipment Co.
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AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER

Batch plant operation is a problem, but...

Freeway Paving Goes Down Fast

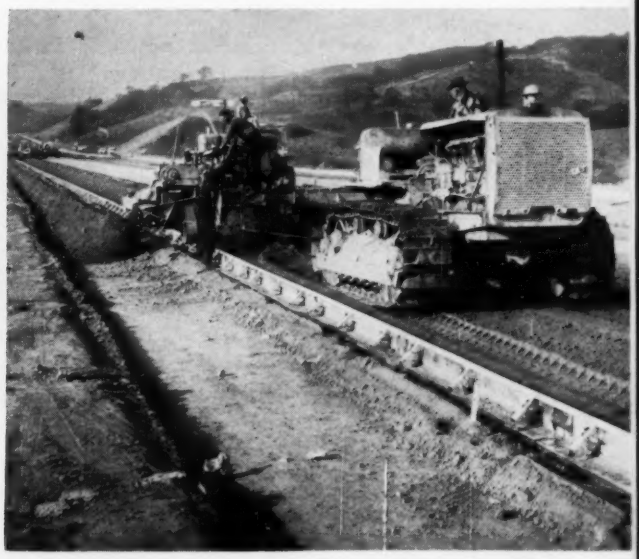
PLACING 2.6 mi of four-lane concrete paving for a California freeway was complicated by two factors—several bridges chopped the job up into small pieces and room for batching facilities was severely restricted.

In spite of these limitations the contractor, Gordon H. Ball of Danville, Calif., placed the 13,500 cu yd of concrete in less than four weeks. He was lucky with weather. And he had a well-organized, well-equipped crew to do the job.

In the Ball organization the same paving crew moves from job to job. Other workmen do the grading work and build the structures. The Lafayette freeway job is the eighth paving job that this same crew worked on in 1956. The crew at Lafayette totaled about 70 men. This includes batch plant operation, batch haul, finish grading, and paving. Of this number, about half moved in as a group from the previous job—air field paving at Palmdale, Calif.,—and most of these men were together all year. The other half of the crew was recruited locally.

The limited room for batching facilities meant that aggregate

AGGREGATES must be trucked in as needed because limited space allows only minimum stockpiling at site of Noble batch plant.



FINE GRADER with conveyor belt discharge is followed by a contractor-built windrow machine. One tractor hauls both units.

(CONTINUED FROM PRECEDING PAGE)

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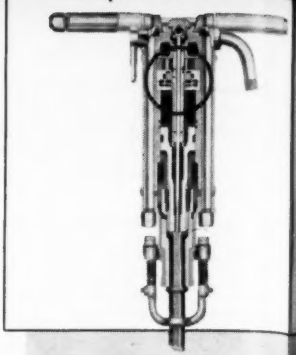

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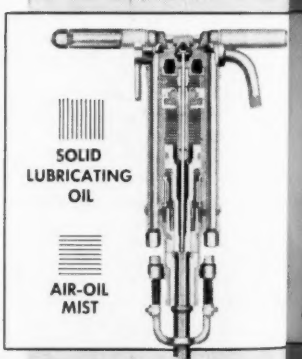

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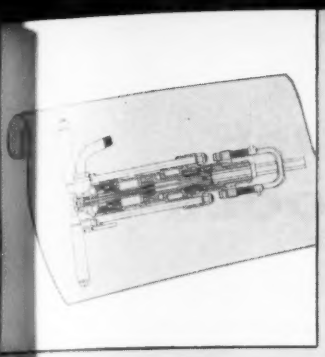

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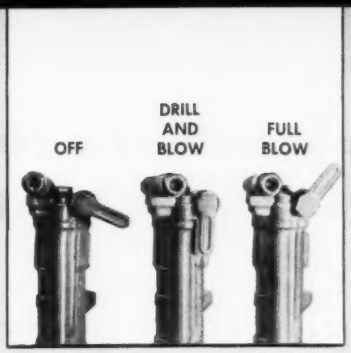

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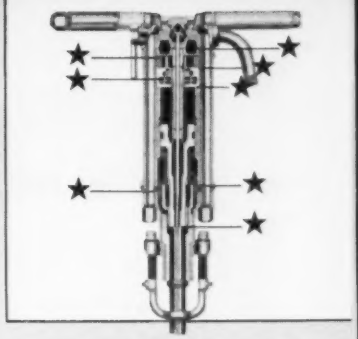

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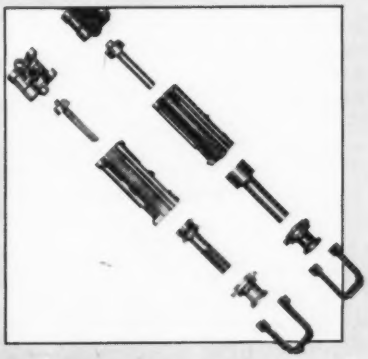

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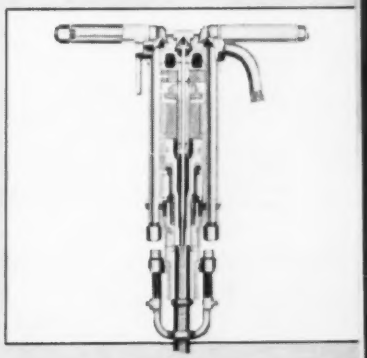

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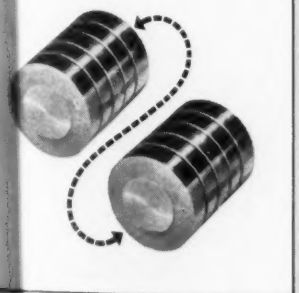

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EASTON - Sears & Bowers
HARRISBURG - Stewart Equipment Co., Inc.
LANSDOWNE - Jayes Equipment Co.
PHILADELPHIA - Stewart Equipment Co.
PITTSBURGH - A. T. Green Machinery Co.
READING - Geo. D. Lessig & Sons
WILKES-BARRE - Stewart Equipment Co.
WYOMING - James Eagen & Sons

RHODE ISLAND
EAST PROVIDENCE - Parker-Danner Co.

SOUTH CAROLINA
COLUMBIA - Summers Road Machinery Co.

SOUTH DAKOTA
RAPID CITY - Stan Houston Equipment Co.
SIOUX FALLS - Stan Houston Equipment Co.

TENNESSEE
CHATTANOOGA - Knox-Tenn Equipment Co.
KNOXVILLE - Knox-Tenn Equipment Co.
MEMPHIS - Tri-State Equipment Co., Inc.

TEXAS
AMARILLO - Texas Machinery & Equipment Co.
BEAUMONT - Boehck Engineering Co.
DALLAS - J. W. Bartholow Machinery Co.
EL PASO - Francis Wagner Co.
HOUSTON - Boehck Engineering Co.
MIDLAND - W. L. Johnson Machinery Co.
SAN ANTONIO - South Texas Equipment Co., Inc.

UTAH
SALT LAKE CITY - Archer Tractor & Machinery Co.

VERMONT
SOUTH BURLINGTON - Parker-Danner Co.

VIRGINIA
RICHMOND - McIlhany Equipment Co.
RICHMOND - Municipal Sales Co., Inc.
ROANOKE - McIlhany Equipment Co., Inc.

WASHINGTON
SEATTLE - Hatten Machinery Co.
SPOKANE - Ferris Equipment Co.

WEST VIRGINIA
SOUTH CHARLESTON - Ray C. Call, Inc.

WISCONSIN
GREEN BAY - Boehck Equipment Co.
MILWAUKEE - Boehck Equipment Co.
MILWAUKEE - J-P Industrial Supplies, Inc.

WYOMING
CASPER - Emrick & Hill Engine & Equipment Co.

ALASKA
ANCHORAGE - Craig Taylor Equipment & Supply Co.

HAWAII
HONOLULU - Schuman Carriage Co., Ltd.

ALBERTA
CALGARY - Wilkinson & McClean, Ltd.
EDMONTON - Wilkinson & McClean, Ltd.
LETHBRIDGE - Wilkinson & McClean, Ltd.

BRITISH COLUMBIA
VANCOUVER - Air Equipment Service Ltd.

MANITOBA
WINNIPEG - Mumford-Medland, Ltd.

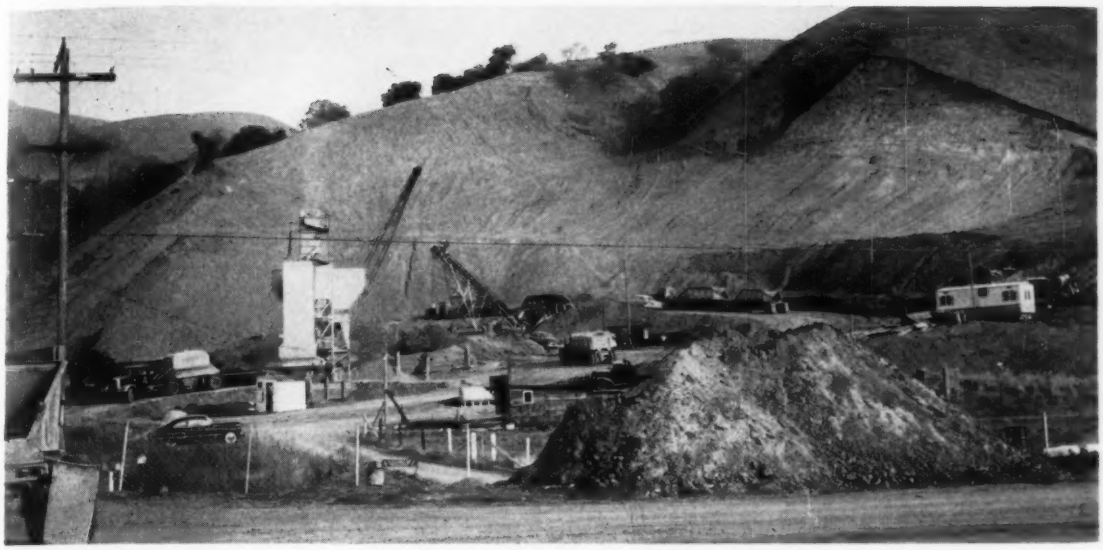
NOVA SCOTIA
HALIFAX - Construction Equipment Co., Ltd.

ONTARIO
DOWNSVIEW - Compressed Air Equipment, Ltd.

QUEBEC
MONTREAL - Construction Equipment Co. Ltd.

SASKATCHEWAN
REGINA - Mumford-Medland, Ltd.
SASKATOON - Mumford-Medland, Ltd.

AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER AIRPOWER



Batch plant operation is a problem, but...

Freeway Paving Goes Down Fast

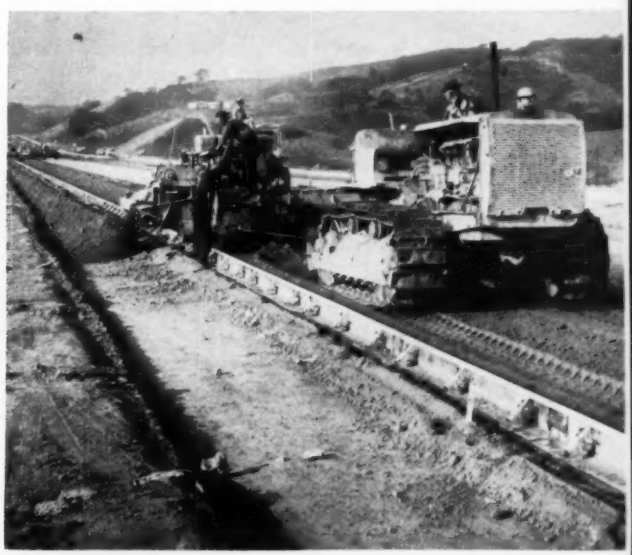
PLACING 2.6 mi of four-lane concrete paving for a California freeway was complicated by two factors—several bridges chopped the job up into small pieces and room for batching facilities was severely restricted.

In spite of these limitations the contractor, Gordon H. Ball of Danville, Calif., placed the 13,500 cu yd of concrete in less than four weeks. He was lucky with weather. And he had a well-organized, well-equipped crew to do the job.

In the Ball organization the same paving crew moves from job to job. Other workmen do the grading work and build the structures. The Lafayette freeway job is the eighth paving job that this same crew worked on in 1956. The crew at Lafayette totaled about 70 men. This includes batch plant operation, batch haul, finish grading, and paving. Of this number, about half moved in as a group from the previous job—air field paving at Palmdale, Calif.,—and most of these men were together all year. The other half of the crew was recruited locally.

The limited room for batching facilities meant that aggregate

AGGREGATES must be trucked in as needed because limited space allows only minimum stockpiling at site of Noble batch plant.



FINE GRADER with conveyor belt discharge is followed by a contractor-built windrow machine. One tractor hauls both units.

Ford Tractors replace heavy equipment, save hand labor

...on 3 million dollar F

Ford's Industrial Loader gives you more capacity per dollar, greater reach and lift to speed loading. It's fully hydraulic . . . available with double-acting lift cylinders that provide positive down-pressure. Can be used in combination with rear-attached scrapers, blades, backhoes.

With a Ford Tractor and fork lift you can handle 2-ton loads of lumber and palletized building materials faster, easier! Rear-mounting over Ford's big tires means greater traction, safety and stability. Fast, easy, hydraulic control of entire fork-lift cycle.

Ford
TRACTORS AND INDUSTRIAL EQUIPMENT

You

ar Florida construction job!

R. M. Thompson Co., Florida construction and engineering firm, cuts costs and saves labor with multi-purpose Ford Tractors and industrial equipment. For example, in Tampa's newest shopping center, Britton Plaza, Thompson used three Ford Tractors to handle many jobs previously assigned to heavy equipment.

Ford Tractors and Industrial Loaders handled shells used as base material for an asphalt parking lot, spread and loaded dirt fill, helped clean up the job site when construction was completed. Fork-lift-equipped Fords handled lumber, concrete blocks, palletized brick . . . even helped move construction shacks.

Ford was first with a low-cost, multi-purpose tractor that could be equipped for a wide variety of materials-handling and earth-moving jobs like these. And, Ford is still far ahead with a line of advanced tractors—from 29 to 40 drawbar horsepower, both Utility and fully-equipped models. Put economical Ford Tractor power to work on your jobs. See your local Ford Tractor dealer, or write direct to: Tractor and Implement Division, Ford Motor Company, Birmingham, Michigan.

You see more **FORDS** *because they save more money!*

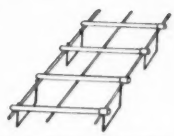
Time and Temper Saver for St. Louis Drivers

STRENGTHENED and STABILIZED with . . .

LACLEDE HIGHWAY STEELS

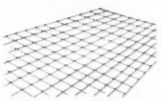
ST. LOUIS' new Third Street Interregional Highway represents the first phase of a multi-million-dollar expressway program designed to speed traffic flow and relieve traffic congestion in the St. Louis area.

Like so many other highways in the Heart of America, this easy-riding high-speed artery is made stronger, safer and more durable with Laclede reinforcing steels.



WELDED DOWEL SPACERS

MULTI-RIB ROUND REINFORCING BARS



WELDED WIRE FABRIC (in sheets)

CENTER JOINTS

RECESS JOINTS

SPIRALS

MISSOURI STATE HIGHWAY DEPARTMENT
GENERAL CONTRACTOR:
Fruin-Colnon Contracting Company

LACLEDE®

LACLEDE STEEL COMPANY

SAINT LOUIS, MISSOURI ◆ Producers of Steel for Industry and Construction

SOIL-CEMENT SUBGRADE that will have a compacted thickness of 4 in. is mixed in place by self-propelled Pettibone-Wood Road-mixer. Cement is in trough at top of windrow, and tank truck on the completed pavement slab furnishes water for the mixing.

PAVING operation is limited to relatively short lengths by bridges that cut across the job, but contractor's crew made good production record despite this handicap. It placed a total of 13,500 cu yd of concrete in less than four weeks.

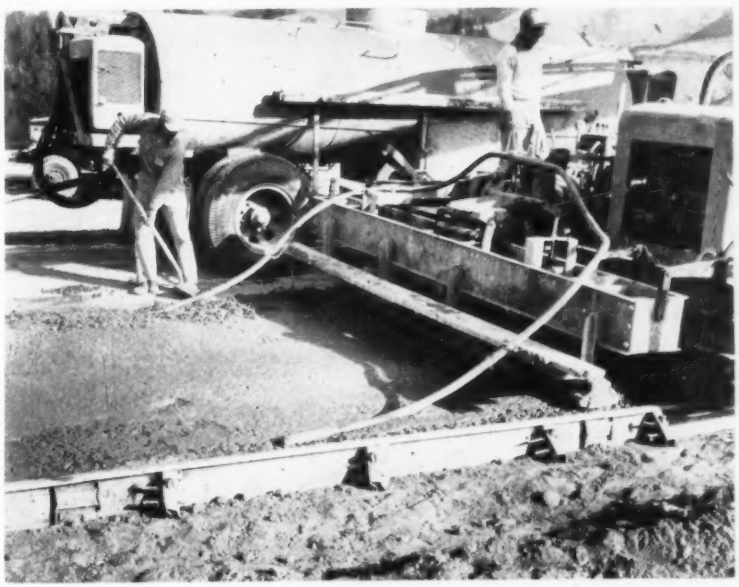
FREEWAY PAVING . . .

Continued

stockpiling had to be kept to a minimum. Accordingly, the materials—sand, ¾-in. gravel and 1½-gravel—were trucked to the job as needed. Ball purchased aggregate from a Pacific Cement & Aggregates, Inc., plant some 15 mi away. Haul was on a contract basis.

The only available batch plant site was near one end of the job. This resulted in greater average batch haul than desirable. But it meant that aggregate haul trucks did not need to travel through the job.

The gravel trucks fed a hopper serviced by a Noble conveyor with remote controls to permit it to shift to either the ¾-in. gravel stockpile or the 1½-in. gravel stockpile. Sand was dumped by the haul trucks in windrows and pushed by



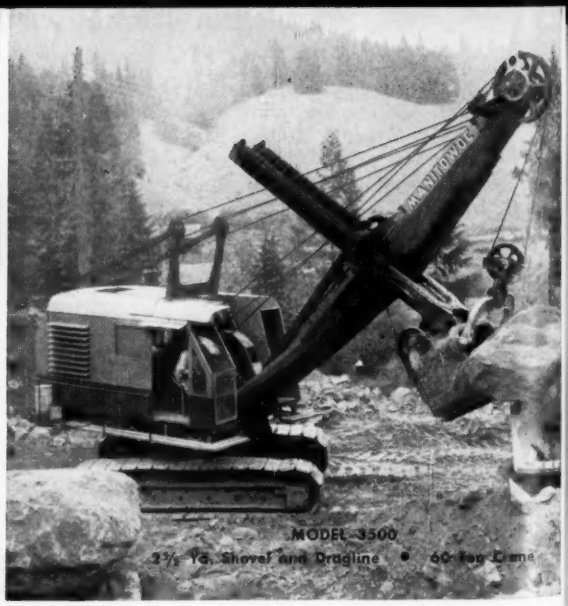
SPREADER with Viber mechanical vibrators to help compact concrete at the edges of the 12-ft pavement is the second unit in the paving spread. It is a Blaw-Knox machine.

Big 5½-yd. Manitowoc Model 4500 has single diesel power package—no complicated electric motors. You get the big capacity needed for modern construction jobs, plus . . . flexible, small-machine maneuverability.

Right down the line—Manitowoc . . .

MODEL 3900
3-3½ Yd. Dragline • 60-80 Ton Crane

MODEL 2800
1½ Yd. Dragline • 40 Ton Crane



MODEL 3500
2½ Yd. Shovel and Dragline • 60-Ton Crane

Lower Bids...More Profit With MANITOWOC

Now is the time to think of new excavating equipment to handle your 1957 jobs. Your competition will be fighting every step of the way for the construction dollar, so you'll want a rig that can give you all the features you need to be low bidder . . . at a profit.

Manitowoc offers more power when the going is rough, greater cycle speed for more yardage, and longer machine life from every unit to keep maintenance costs way down. You'll find your only real competitor is another Manitowoc owner! Capacities range from the fast, rugged 1-yd. Model 1600 to the big, powerful 5½-yd. Model 4500 — a full line to let you meet all job requirements.

You get more bite at the dipper with any Manitowoc because of an exceptionally efficient, simple upper works design. An exclusive sliding pinion arrangement provides fast, smooth operating speeds with direct power flow — eliminates unnecessary power-robbing gears and pinions. Sturdy construction throughout guarantees years of extra service with less downtime.

Massive carbodies and large, wide crawlers assure safe stability for any job. A simple, rugged travel drive and positive steering take your Manitowoc with fast, sure mobility over the roughest terrain.

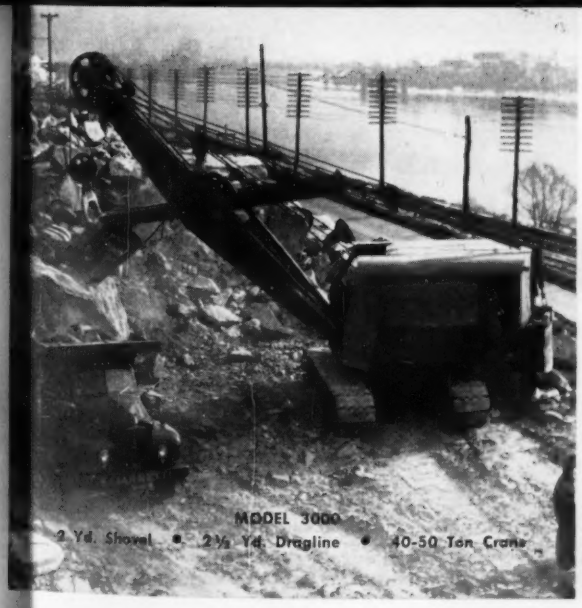
Optional features like air controls, torque converter power and elevated cabs increase operator efficiency and comfort — help to finish work ahead of schedule. And all Manitowocs are easily convertible for a variety of assignments.

Find out why more and more successful contractors are turning to Manitowoc for additional profit per job. Your helpful Manitowoc distributor has complete specifications and details on the entire line of quality Manitowoc excavators and cranes. See him now to get the jump on competition for 1957!

Manitowoc Engineering Corp., Manitowoc, Wisconsin.

MANITOWOC
SHOVELS 1-5½ YD. Speedcrane CRANES 20-100 TON

...means more machine for your dollar!



MODEL 3000
2 Yd. Shovel • 2½ Yd. Dragline • 40-50 Ton Crane

MODEL 2000
1½ Yd. Dragline • 25 Ton Crane
1¼ Yd. Shovel & Trench Hoe

MODEL 1600
1 Yd. Shovel & Trench Hoe • 1¼ Yd. Dragline • 20 Ton Crane

FREEWAY PAVING...

Continued

a Caterpillar D8 tractor to within reach of the Northwest No. 6 crane that serviced the batch plant.

Batch haul trucks handled five 1½-cu-yd batches. As many as seven trucks were used depending on length of haul.

The paving crew for Ball took over after all grading was completed. A special crew set steel header boards for the 8-in. thick pavement. Fine grading was accomplished by a conveyor belt equipped Simball machine. This was followed by a windrow machine made by the Ball people. Both these units were hauled by a single Caterpillar D8 tractor. After cement was spread in the windrow trough, soil-cement subgrade material was mixed by a Pettibone-Wood self-propelled Roadmixer—the newest piece of equipment in the Ball paving spread.

The subgrade material was then spread by a second conveyor belt equipped machine. Compaction of the 4-in. soil-cement layer was by a steel tandem roller followed by a rubber-tired vibratory roller.

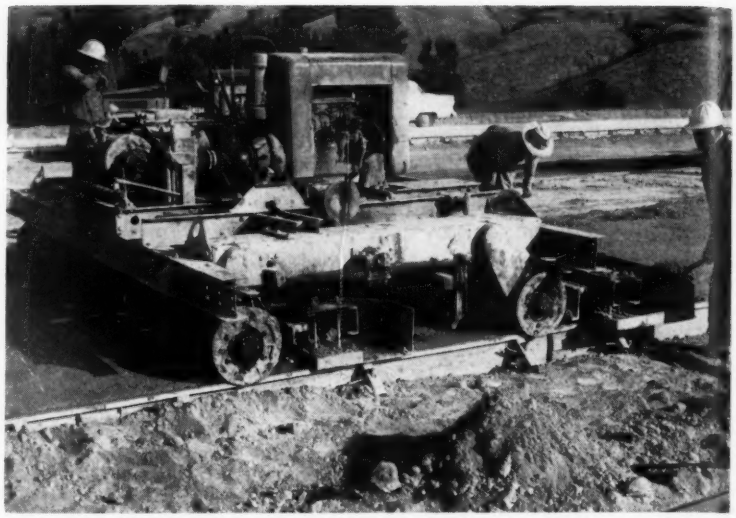
The rest of the spread included a Koehring 34E paver, a Blaw-Knox spreader, a Blaw-Knox finisher, and a Johnson float. Curing compound application and contraction joint sawing was handled by a subcontractor—A. R. Reid Co. of San Francisco.

Although the several bridges on the 2.6-mi. contract chopped the paving runs into relatively short lengths, Ball's production was good. His crew placed as much as 1,250 cu yd of concrete in one 8-hr day.

Total contract price was $3 million. Of this a little more than $500,000 went for structures. The job included several high fills—up to 68 ft. And it included 1,500,000 cu yd of roadway excavation.

Paving concrete was bid at $15 a yard in place. Mixing, spreading, and compacting the 61,000 sq yd of 4-in. thick soil-cement was bid at 23¢ a sq yd.

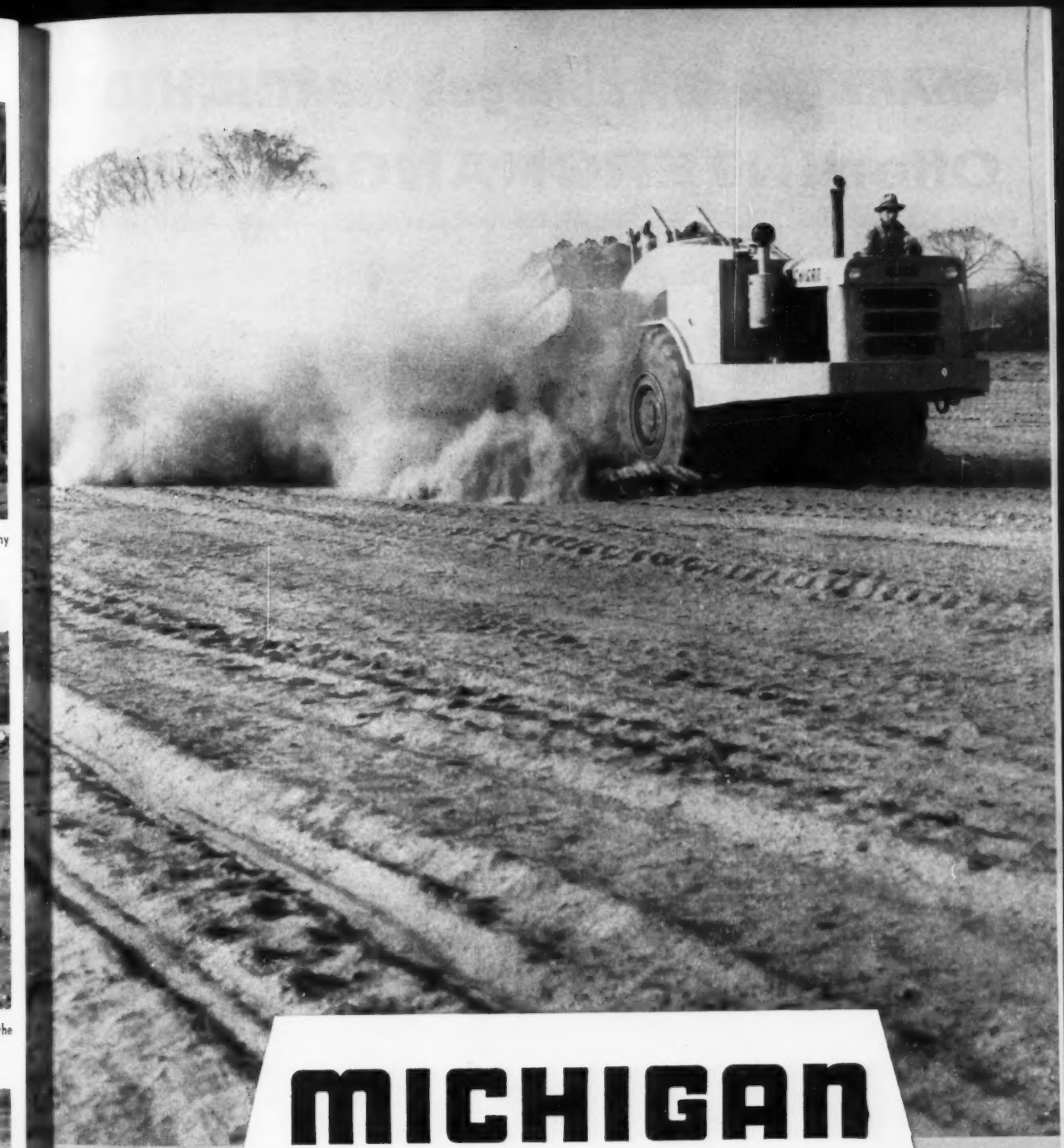
Fred Straub was general superintendent, and F. E. "Bill" Appel was paving superintendent for the contractor. Resident engineer for the California Division of Highways was Don Young. The Lafayette freeway is located on State Highway 24 between Walnut Creek and Oakland. It is one of the San Francisco Bay area's heavily traveled commuter routes.



FINISHER, also a Blaw-Knox machine, is the third unit in the paving spread. It removes any irregularities left by the spreader, and it also assists in compaction.

FINAL UNIT in the spread is a Johnson float. This machine makes several passes over the pavement as the concrete nears its set to insure a uniform, smooth surface.

HAND FINISHER adds the final touch. Among other things, he is responsible for preventing any noticeable bump where new concrete adjoins already hardened pavement.



MICHIGAN
is on the move

with the most exciting equipment news in years

CLARK greatly enlarges the MICHIGAN

Offer INTERCHANGEABILITY

NOW Available
8
TRACTOR SHOVELS
16 cu ft to 6 cu yds
Including 2 big new models

3
TRACTOR DOZERS
two of them brand new
165, 210, 375 hp

3
ALL-NEW TRACTOR SCRAPERS
10½, 18, 27 cu yds heaped

...line of high-speed rubber-tire earthmovers ...never before possible!

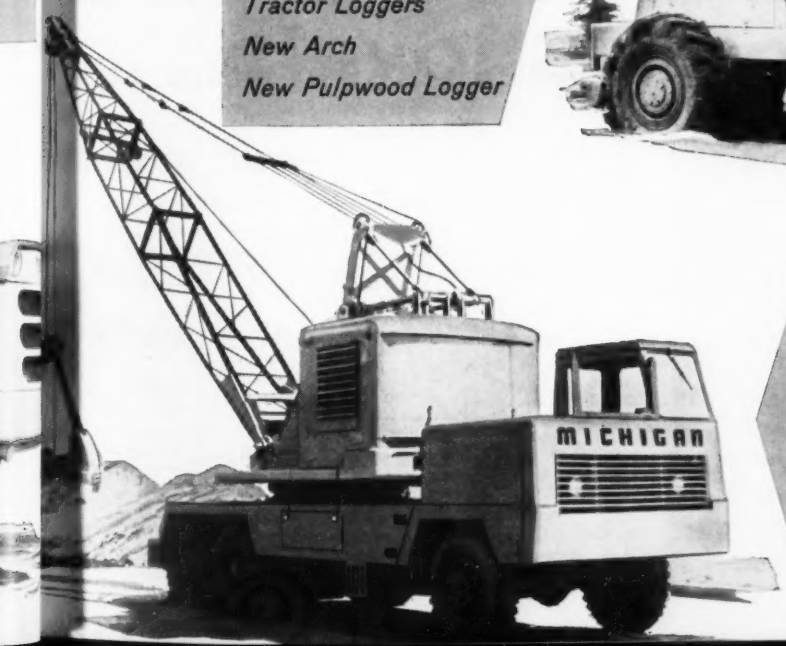
Clark's new MICHIGAN line, shown for the first time at the Road Show in Chicago, gives you two major advantages no other manufacturer can offer:

1. Because Clark designs and builds all drive components of every Michigan machine, you get power train *efficiency* unmatched in the earthmoving industry. The design of this power train is the same one Clark developed in 1954 for the first MICHIGAN Tractor Shovel . . . the same one that has been used in all 5,000 MICHIGAN Tractor Shovels sold since then.

2. Because Clark designed and engineered its entire big line at one time, you get a degree of interchangeability never before available. In each of the three size ranges of scrapers, tractor shovels, dozers and loggers, you have *the same* engine, the same power shift transmission, the same torque converter and planetary-wheel axles. In fleet operation, you get the great efficiencies of matched horsepower and matched speed. And you need far less than the ordinary spare parts investment.

SEE FOLLOWING PAGES FOR DETAILS ——▷

4
LOGGERS
10 and new 20-ton
Tractor Loggers
New Arch
New Pulpwood Logger



3
EXCAVATOR-CRANES
10, 15, 25 tons

Four passes of 6-yard bucket is all it takes to load a 25-yard truck.

New from MICHIGAN

2 big Tractor Shovels

6 and 4 cubic yards

MODEL 375A

6 cubic yard; 30,000 lb lift capacity
4 speeds, forward and reverse, to 28 mph
375 horsepower. All-wheel drive
56,000 lbs empty weight

MODEL 275A

4 cubic yards; 22,000 lb lift capacity
4 speeds, forward and reverse, to 28 mph
210 horsepower. All-wheel drive
38,000 lbs empty weight

A COMPLETE LINE OF TRACTOR SHOVELS: A SIZE TO FIT EVERY NEED

	Model 12B	75A 75B 75R	125A	175A	275A	375A
Horsepower (Diesel Models)	44	80	120	133	210	375
Bucket Capacity (SAE rating)	16 cu ft	1¼ yd	2 yds	2¾ yds	4 yds	6 yds
Weight (lbs)	6,250	13,450	19,675	25,550	38,000	56,000

All MICHIGANS feature all-Clark power trains. Power-shift transmission, torque converter, planetary-wheel drive axles standard. Models 175A, 275A, 375A use same power train components as similar sized Tractor Scrapers and Tractor Dozers.

This dozer gives you the "push" of 375 hp, coupled to 62,000 lbs of weight.

2 new Tractor Dozers

with unmatched pushing power

MODEL 380

375 horsepower. Full-time all-wheel drive 4 speeds, forward and reverse, to 28 mph Power Shift. Power Steer. Torque Converter. 62,000 lbs weight with 13'3" blade.

MODEL 280

210 horsepower. Full-time all-wheel drive 4 speeds, forward and reverse, to 28 mph Power Shift. Power Steer. Torque Converter. 42,000 lbs weight with 11'3" blade.

PLUS CURRENT MODEL 180

165 horsepower, 27,000 lbs weight. 27 mph speed. Swinging drawbar, power-tilt, down-pressure standard—same as on two larger models.

Full traction while turning. All four wheels are always driving. You *steer* around turns, don't wear out the wide-base tubeless tires by dragging or braking inside wheels.

Fingertip steer, instant reverse. You doze forward at rubber-tire speeds, back up at speeds to 28 mph at flick of finger. Power steer positions you fast for next push.

New this year . . .

3 MICHIGAN

MODEL 310

27 yards heaped. 20 yards struck (SAE rating). 375 hp
Speeds to 32 mph
Weight: 63,000 lbs empty

MODEL 210

18 yards heaped. 12.7 yards struck (SAE rating). 210 hp
Speeds to 31½ mph
Weight: 40,000 lbs empty

1. Power train same basic design as one proven in over 5,000 Michigan Tractor Shovels. Includes Clark torque converter, power-shift transmission, planetary wheel axle.

2. No-spin differential automatically transfers power from drive wheel on poor footing to one on good footing. Low-pressure tubeless tires add traction and flotation.

3. 90° turns under power. Michigan Tractor Scrapers can make non-stop U-turns in less than their own length. All sizes have finger-tip power shift, need no clutching.

Tractor Scrapers

MODEL 110

10½ yards heaped. 8 yards struck (SAE rating). 165 hp
Speeds to 30 mph
Weight: 29,000 lbs empty

4. Completely-sealed hydraulic controls eliminate all cables, all electric wires and motors. Scraper blade and apron operate independently, can be lowered even with engine stopped.

5. Full-time power steering. Two automatically selected turn ratios: low, for safe control at high speeds; high, for easy maneuvering at low speeds.

6. Unit assembly makes for fast servicing. All components easy to get at. Transmission, for example, mounted at rear of prime mover. Frames all-welded.

New from MICHIGAN

3 *high-speed* Loggers

A huge Tractor-Logger MODEL 375

Lifts 40,000 lbs
Handles logs 8 ft in diameter
210 horsepower. All-wheel drive.
Top speed, 30 mph
Has same basic design as veteran 10-ton Model 175 Tractor Logger which has proved so successful in reducing handling costs for loggers everywhere.

Pulpwood Logger Picks up own load, up to 12,000 lbs. Travels anywhere at speeds of 30 mph. Hydraulic power steering. Wheels individually suspended for full-time 4-wheel drive. Designed under the auspices of Canadian Pulp & Paper Association.

Logging Arch

Couples to 210
two-wheel Michig
prime mover. To
25 tons of logs
31½ mph. We
40,000 lbs. Big 2
25 tires add tract
for high-speed ha
over poor footin

MICHIGAN
Excavator-Cranes

MODEL T-25

Truck Mounted
25 tons, ¾ yard
Crane weight, 51,000 lbs

MODEL T-20

Truck Mounted
15 tons, ½ yard
Crane weight, 41,000 lbs

MODEL C-16

Crawler Mounted
10 tons, ½ yard
Crane weight, 25,575 lbs

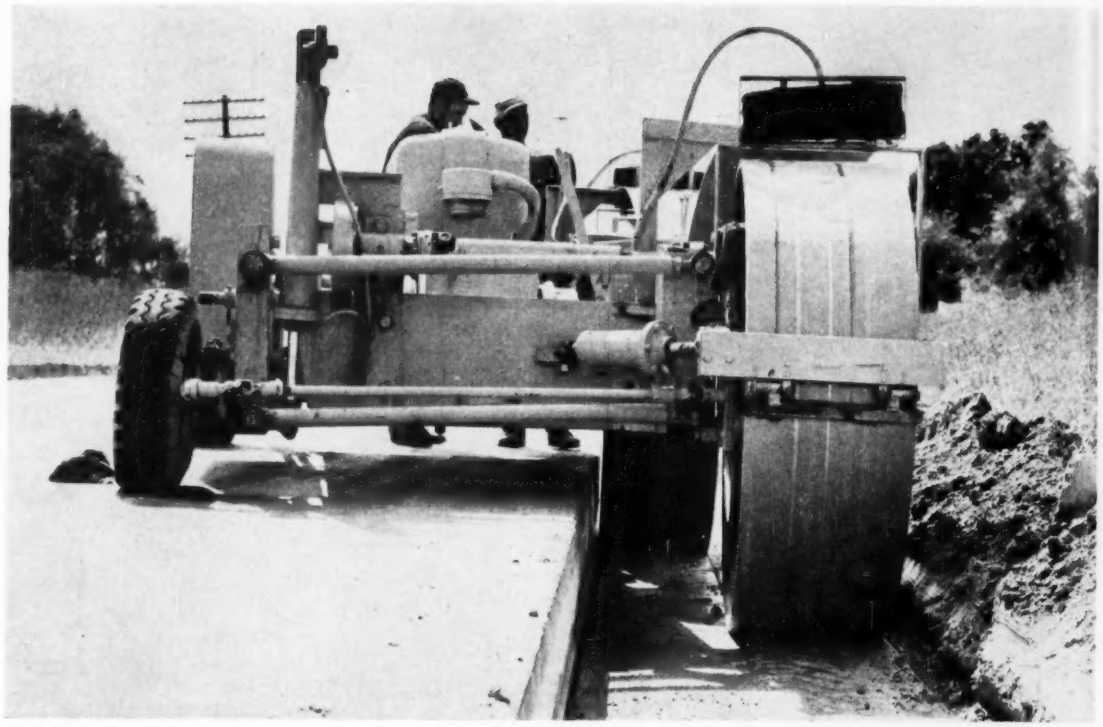
Truck models readily strip for highway travel. Full line of interchangeable front end attachments available for all models.

Production models of both new and current MICHIGAN Tractor Shovels, Tractor Dozers, Tractor Scrapers, and Tractor Loggers—as well as these Excavator-Cranes—will be on display at the Road Show in Chicago, January 28 to February 2. We will be very happy to show them to you there.

CLARK® EQUIPMENT

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2403 PIPESTONE ROAD, BENTON HARBOR 1, MICHIGAN
In Canada: Canadian Clark, Ltd., St. Thomas, Ontario



DUAL DRUMS on Blaw-Knox's new trench roller can be shifted from 30 to 39-in. widths while the machine is in motion. Each roll also can be steered independently making it possible to work to the curves of existing roadway without reducing speed.

Dual Drums Roll Trench Bottom

FIRST MACHINE on the job is this Allis-Chalmers grader fitted with a trenching blade. Trenching blade is attached to grader's regular blade. It opens a trench 16 in. deep.

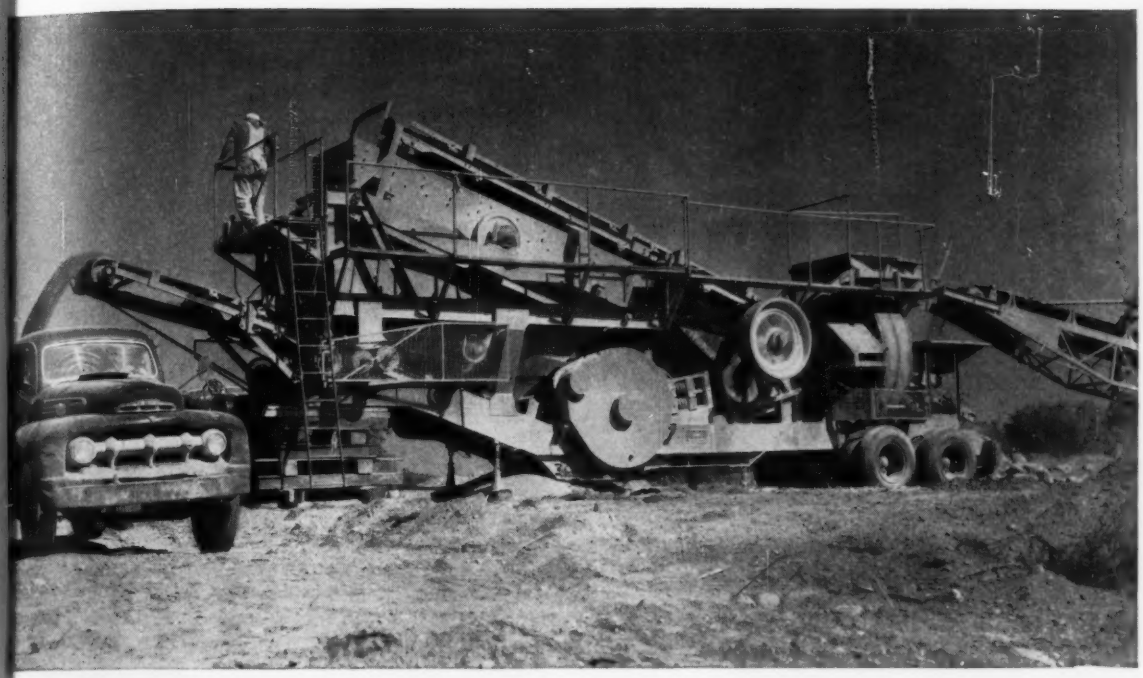
A NEW DUAL-DRUM trench roller is a standout performer on an 8-mi road widening job near Gallipolis, Ohio.

The road is being widened from 19 to 24 ft and resurfaced by Standard Asphalt and Tar Co. of Charleston, W. Va. To do the job, Standard uses a package of paving equipment that includes road wideners, a single and a dual drum trench roller, and a bituminous paver finisher.

Two Allis-Chalmers graders equipped with trenching blades first cut out a trench slot 16 in. deep and 38 in. wide along the side of the existing pavement. Blaw-Knox's new dual compression roller then goes to work.

"Frankly, at first we were a little up against it to find something with which to roll the trenches," said W. H. Bailey, job superintendent. "So I called our Charleston office and told them I had to have something. They sent me the roller. We put it right to work, and it goes like a charm."

Continued on page 141



Production at a profit . . . wherever you use it

DIAMOND 77 PORTABLE CRUSHING and SCREENING PLANT

Here are the cost-cutting, production-boosting advantages that put Diamond way out in front:

- ★ **Big, powerful crushing capacity with a 10″ x 36″ jaw crusher and a 36″ x 22″ star gear roll crusher.**
- ★ **Speedy separation of material on a 4′ x 12′, 2½ deck vibrating screen.**
- ★ **30″ wide belt conveyors.**
- ★ **The Diamond "line-flo" rotor-lift principle that guarantees fast, continuous movement of aggregate.**

You get all these in a Diamond plus complete portability . . . a hydraulic mechanism to lower the screen deck to travel position . . . and rugged Diamond construction throughout for practically any type of crushing operation. No wonder reports from the field read like these:

"300 to 400 tons per hour of road gravel in 25% to 35% crush" . . . "less down time, more production" . . . "oversize roll crusher and screens do the trick" . . . "smoothest operating plant we have seen".

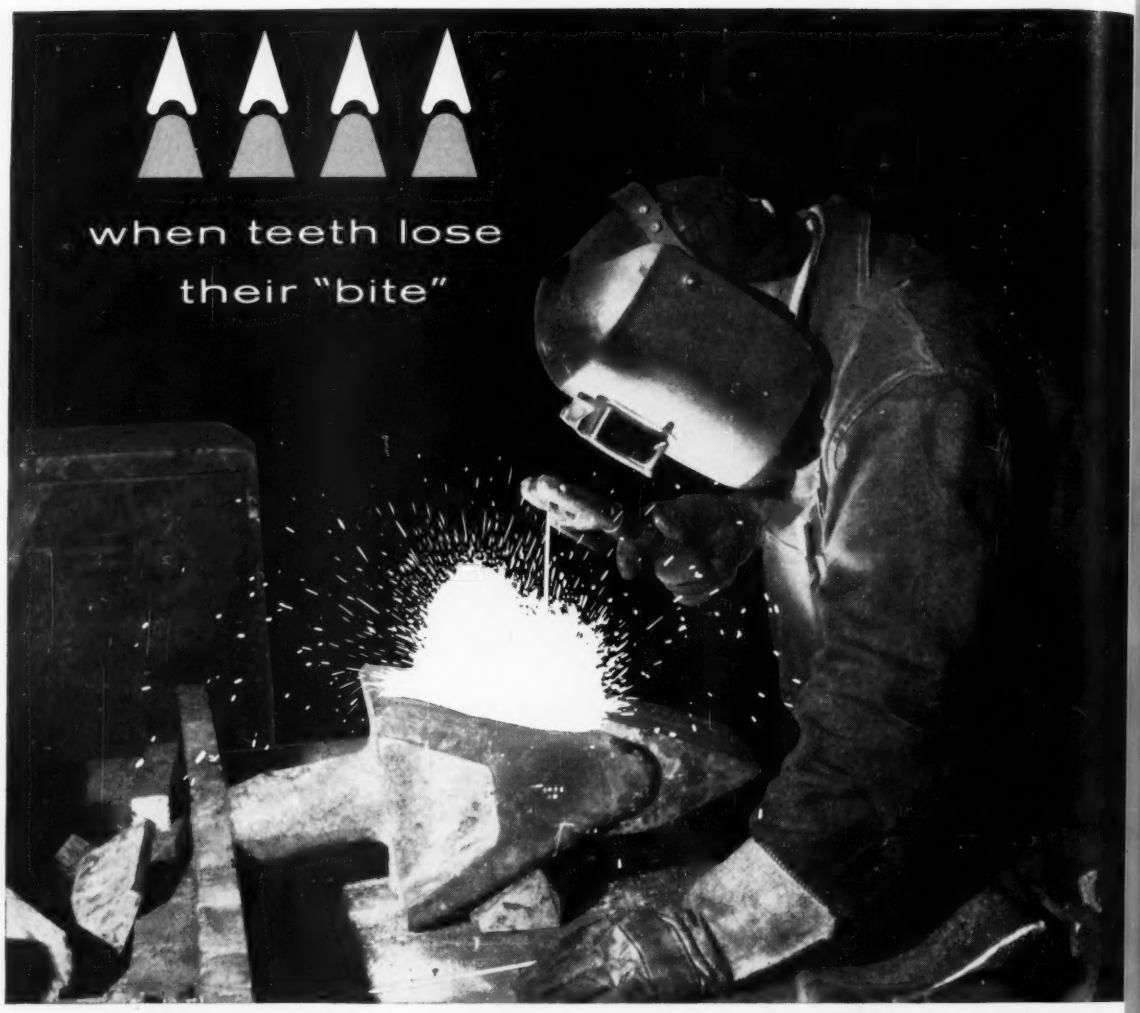
And remember . . . Diamond gives you a choice of drives. Mechanical drive with one power unit is standard. Optional drive: (1) one power unit to drive crushers with electric motors to drive screens, rotor-lift and conveyor, and (2) same as No. 1 except for motorized head pulleys on all conveyors.

There will be a Diamond Type 77 "All American" plant at the Road Show. Be sure to see it.

DIAMOND IRON WORKS
division
GOODMAN MANUFACTURING COMPANY
Halsted Street and 48th Place • Chicago 9, Illinois

Everything For The Aggregate Producer

Jaw Crushers • Roll Crushers • Conveyors • Screens and Washers • Feeders and Bins • Portable and Stationary Crushing Plants For Rock and Gravel



It's a **15-MINUTE REBUILDING JOB** with Amsco® Cast-to-Shape Repointers

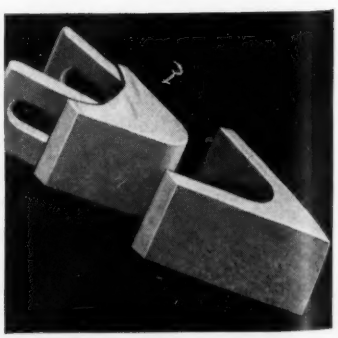
Easy to weld on . . . add strength and service life to entire tooth

Where dipper-tooth wear is moderate, and where digging conditions are not too severe, Amsco Cast-to-Shape Repointers provide a cost-saving answer to tooth replacement.

An average-size tooth can be completely rebuilt in about 15 minutes. The repointer overlaps the tooth top and bottom and is easily welded in place, using only a few electrodes.

Cast of Amsco Manganese Steel, with "ears" that protect the flat sides of the tooth, these repointers add strength and service life to the entire tooth. Available as individual repointer units, or in bar lengths.

For heavy digging, use Amsco "Wear-Sharp" Repointers or Repointer Bars. Order Amsco Repointers from your nearby Amsco Distributor.



AMERICAN Brake Shoe COMPANY

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American Manganese Steel Division • Chicago Heights, I

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS; JOLIETTE, QUEBE

Distributed in Canada by Canadian Liquid Air Co., Ltd.

WIDENER follows up roller and puts down two 5-in. courses of sand and gravel, each of which then is compacted by the roller. These same wideners also place two 3-in. course of asphaltic concrete to bring pavement up to existing road surface.

PAVER-FINISHER resurfaces entire roadway with a ¼-in. course of bituminous concrete after the road has been widened from 19 to 24 ft. Paver-finisher is a Blaw-Knox. The entire surface then is rolled with two Buffalo-Springfield rollers.

The roller rides on the existing road surface on two rubber tires. These are synchronized with two 60-in. dia, 20-in. wide compression rolls that ride inside the trench exerting a compression per lineal roll inch of from 250 lb without water ballast to 345 lb with water.

During rolling the operator sits between the two rolls. He is able to watch the edge of the pavement regardless of which direction the machine is moving. Reversed fan blades on the engine blow hot air and dust away from him.

The operator can change the position of the rolls to vary rolling widths between 30 and 39 in. while the machine is in motion. Position changes enable the machine to work greater widths in a single pass and makes back rolling unnecessary in many cases.

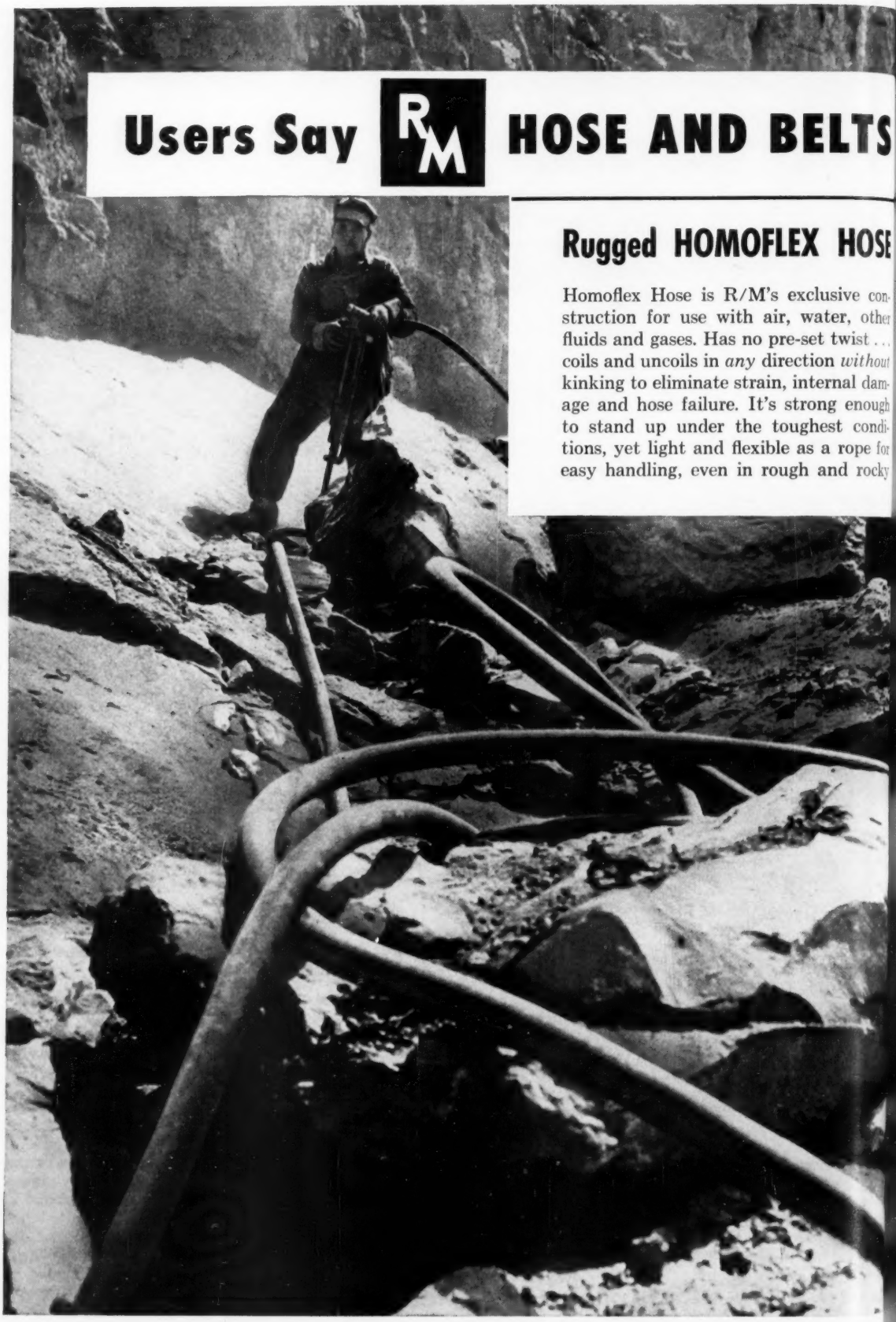
Each compression roll can be steered independently through hydraulic controls, making it easy to work along normally difficult curves. The rig operates both forward and reverse in speeds ranging from 1.62 mph to 5.55 mph.

Heavy chain-driven sprockets transmit power to the wheels. Each has a separate brake. Water for sprinkling is supplied by a foot-controlled pressure pump from a 60-gal tank. Though trenches on this job are only 16 in. deep, the roller can work to a depth of 24 in.

Once the roller has compacted the trench, one of the wideners spreads two 5-in. courses of sand and gravel, each of which is compacted by the roller. A 3-in. course of bituminous base next is placed, rolled and followed by a second 3-in. surface course of bituminous.

The entire 24-ft width of the roadway then is resurfaced with a 1¼-in. course of bituminous concrete. The whole is given a final rolling by Buffalo-Springfields.

Users Say R/M HOSE AND BELTS



Rugged HOMOFLEX HOSE

Homoflex Hose is R/M's exclusive construction for use with air, water, other fluids and gases. Has no pre-set twist . . . coils and uncoils in *any* direction *without* kinking to eliminate strain, internal damage and hose failure. It's strong enough to stand up under the toughest conditions, yet light and flexible as a rope for easy handling, even in rough and rocky

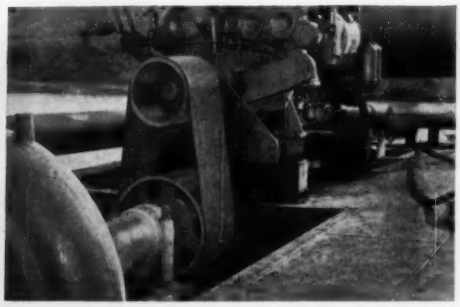
Give You "More Use per Dollar"

. . . is "Flexible as a Rope"!

conditions. Cover, strength member and tube are virtually inseparable. Uniform inside and outside diameters make Homoflex easier to couple, too.

You get "More Use per Dollar" *two* ways . . . Easier handling helps workers to get more work done . . . Hose lasts longer.

Write for Bulletin #6879



Eliminate Belt Matching Problems with R/M POLY-V® DRIVE!

R/M's patented Poly-V Drive employs a *single, endless* V-ribbed belt — eliminating common V-belt matching problems. This new drive delivers up to 50% more horsepower capacity than an ordinary multiple V-drive. Just two cross-sections handle all drive requirements. Lower inventory of belts and sheaves — less maintenance. You get "More Use per Dollar."

Write for Bulletin #6638

For the "Smoothest Running V-Belts Made" Specify CONDOR or R/M SUPER-POWER V-BELTS

*Poly-V is a registered Raybestos-Manhattan Trademark.

RAY-MAN CONVEYOR BELTS Haul Heavier Loads at Lower Cost

This heavy duty conveyor belt has the easy troughability and wear resistance to handle fuller, heavier loads. Cushioned strength members give resilience to the impact of shock loading . . . and flexibility to train naturally. Balanced double compensation construction relieves outer ply stress, prolongs belt life. Ray-Man Conveyor Belt resists gouging and ripping . . . holds fasteners much better than other types of belts . . . requires no breaker fabric. Like all Raybestos-Manhattan heavy duty belts, Ray-Man is moisture resistant and mildew-proof . . . and features the exclusive "XDC" Cover which greatly increases protection against wear, tear, cuts and abrasion . . . You get longer, trouble-free service . . . "More Use per Dollar."

Check also R/M's extra-cushioned Homocord belt for unusually abusive shock loading . . . and R/M Tension-Master for extra long lifts, high tensions.

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RM 702

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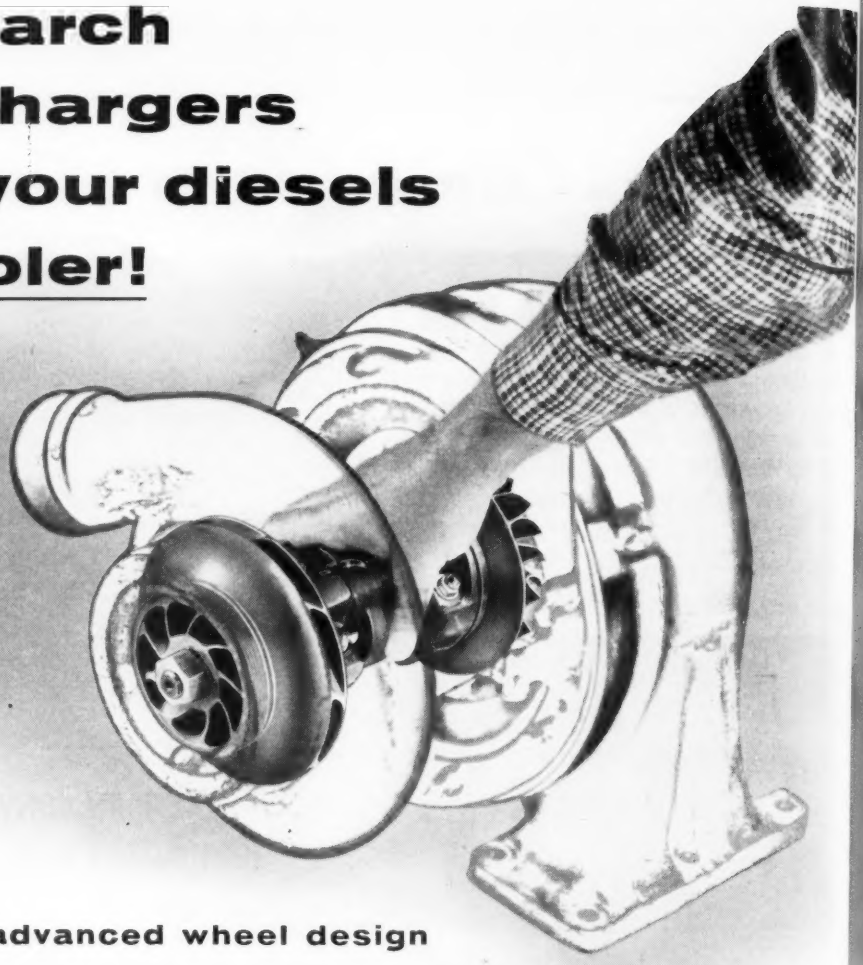
AiResearch Turbochargers make your diesels run cooler!



Factors like advanced wheel design and perfectly matched turbine and compressor keep engine thermal loading at a minimum

So effective is the AiResearch turbocharger that it provides power gains while actually lowering the heat level of the engine.

Ambient air is compressed with an efficiency as high as 82%, feeding a maximum weight of air into the cylinders at the lowest possible temperature.

Results: maximum power gain at minimum fuel cost; complete combustion with elimination of objectionable smoking; low engine thermal loading insuring long, trouble-free operation.

All AiResearch turbochargers are air cooled, placing no added burden on the diesel cooling system and requiring no complicated plumbing. The rotating assembly is removable as a unit, simplifying in-the-field maintenance. This advanced design evolved from the most extensive experience in the field of small turbomachinery in America.

Your inquiries are invited.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-10	T-14	T-15	T-30-2	T-30-6
Diameter — in. nom.	9	11.5	15.25	15.25	16
Length — in.	9	14.12	16.75	17.25	21.75
Weight — lb.	40	95	125	135	195
Output — lb/min. (Standard Conditions)	25-40	35-65	35-65	70-95	115-175

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

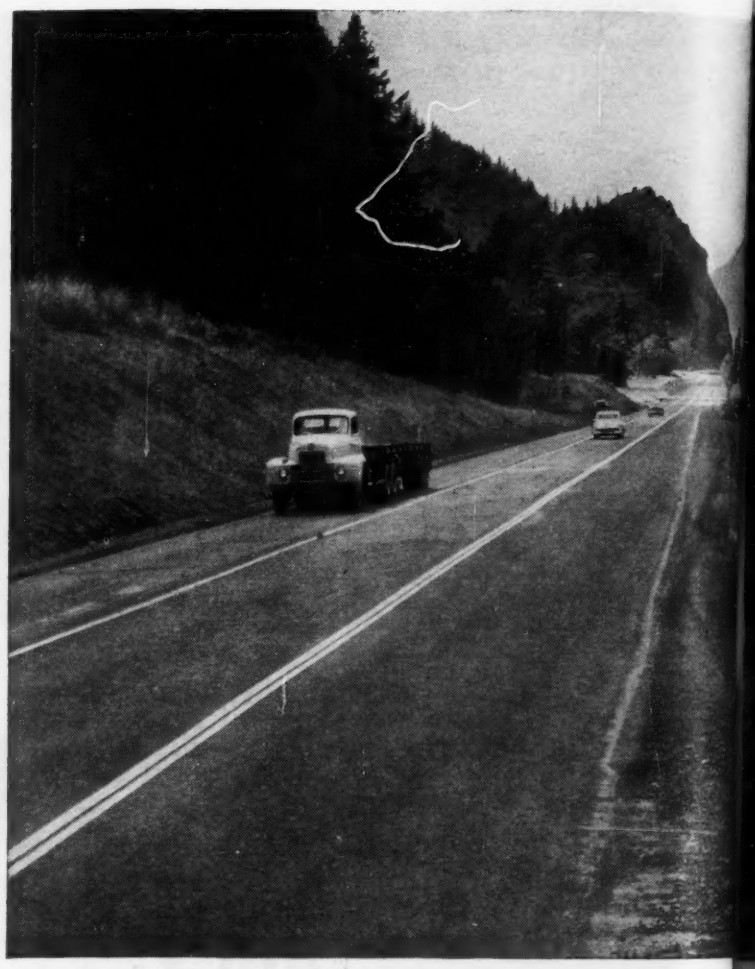
DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

A staff report by
the editors of Engineering News-Record and
Construction Methods and Equipment

TOOLS OF THE ROADBUILDER

- *What's available*
- *What they can do*
- *How they have developed*
- *Where they are going*

FROM FIRST SURVEY PARTY . . .



TO FINISHED SUPERHIGHWAY . . .

Behind the Road Program—the Ma

UNDERLYING the planning, the spending and the hopes for the great new $33 billion interstate highway program—and for the $70 billion or more of total road expenditures foreseen over the next 13 years—is one cardinal fact:

The whole program is possible—within the time and for the price—largely because of the fantastic capacity, versatility, and availability of the machinery now being put into the hands of U. S. contractors.

It would seem that no recital of the advances in machinery is necessary—the horse-drawn Fresno scraper is within easy recall of many of the readers of these pages—but the story is so tremendous in its scope, so much a matter of pride to the construction industry, and so full of consequences bearing on future progress, that no amount of retelling can overdo it.

Even such an equipment display as the forthcoming Road Show in Chicago doesn't bring out the full meaning—presenting, rather, the conclusions in terms of the spectacular machines that are typically American combinations of ingenuity, research, and manufacturing skills.

How these machines came to be, what they can do, and what will develop from them forms the significant background. This is the story that is told in the pages that follow.

Big and getting bigger

Much-overworked words like "huge", "mammoth", "tremendous" come easily to the tongue when one talks about construction machinery—and the words in this case are not improper. In fact, they're not descriptive enough for:

Machines so enormous they can pick up the equivalent in volume of a small house; machines that can lift tons of material over a hundred feet into the air and place them delicately where men want them to be; machines that

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. . . TAKES A LOT OF THIS

Machines That Make It Possible

working together, can take in, chew up and treat raw materials and spew out finished roads; tires so huge that a single one could supply all of the rubber needed for all of the tires of eight ordinary pleasure cars; or machines with an uncanny, animal-like vitality of their own, capable of making three or four different movements at the same time. These are the kind of machines that today's construction men accept as their due.

From the Fresno—with its quite literal 1 or 2 hp —to the monstrous carrying scrapers of today, drawn by nearly 500 hp and with capacities to 43 cu yd at a bite—the machines have been getting bigger. And they'll get bigger yet.

The reason is a typically American one: The job gets bigger all the time. Equipment and labor prices have tripled in the last decade, but the price of moving dirt has remained very nearly the same. With a highway program such as has been staked out, earthmoving will amount to the billions of cubic yards; structures into the hundreds of thousands. And machines must be built so that more work can be done per man.

Moreover, the new roads will often be built not where nature has provided the best possible conditions of terrain and subsoil, but in places where men want them to be for their own convenience. When nature isn't cooperative, it must be shaped to conform.

Specialized and versatile

But in the midst of the trend to bigness in the machines, there are other requirements that also must be satisfied.

In many of the earthmovers and paving equipment, the growth in size—and cost—of the machine has made it more and more a specialized tool. A scraper that can load 30 or more cubic yards at a time; a crane that can lift

150 tons; a belt-loader that can move 12,000 cu yd in an 8-hr shift; a dump body that can carry 50 cu yd; a batching and mixing plant that can turn out hundreds of cubic yards of concrete an hour—these are expensive, and require special working conditions and huge production schedules for efficient use.

In contrast to these, then, two of the tools in particular emphasize something else besides size and power: versatility.

The tractor—on rubber or crawlers—that can be a dozer, a prime mover, a crane, a backhoe, a front-end loader, a pipelayer, a shovel—is one of these machines. The other is the mobile crane—also either on rubber or crawlers—that can be a shovel, a crane, a materials handling unit, a pile-driver, a backhoe. These are machines that a contractor gives no rest—and that he draws on for greatest use.

Concurrently, too, there has been considerable development of very small machines—most of them also special-purpose. Tiny rollers, almost miniscule loaders and tractors, tampers and the like have been coming out of the factories for special small jobs like paving shoulders, drives, making curbs, getting into and out of restricted working areas. The motorized buggy is also one of these new small machines, but with a big as well as small job potential.

Prime developments

But with all this, there are perhaps six major points of development within the machines themselves, which should be kept in mind by the visitor to the road show and the user of the machines. For from them, either singly or in combination, have flowed most of the innovations in size, capacity and versatility.

A tabulation, not necessarily in order of importance, would run this way:

1. Rubber tires. The developments in the composition of the tires themselves—including the use of synthetics for greater strength and heat resistance—their durability, flotation, tractive power, have added 20 to 30 mph to the speed of construction haulage, and increased immeasurably the maneuverability and transportability of the machines.

2. Metals. Methods of hardening and treating metals, to improve them both for use within the engine and its moving parts, have almost eliminated such problems as stripped gears and greatly increased the usability of the power. Bucket teeth, loader edges, drill steels have also benefited.

3. Lubricants. Improvements in greases and oils—and fuels as well—which have eliminated the need for dozens of different grades and kinds of lubricants for various moving parts, have cut maintenance problems for the contractor, lengthened the life of the machines.

4. The torque-converter. This device for increasing the twisting power of the engine has provided the answer to two important needs: To get more power out of the engine without increasing its size; to get smooth application of power to deal with varying loads; to make it difficult for an unskilled operator to apply damaging shock loads to the machine. In effect a super hydraulic drive, the torque converter has reduced the number of wearing parts, and drastically cut down the number of controls.

5. Operator comfort and convenience. Despite its power and capacity, no machine runs better than its operator "tells" it to. And the machines were getting beyond the operator's physical capacities—control levers, buttons and pedals multiplied too fast for a man to work them efficiently and smoothly. The trend is now toward simplification of controls (made possible in part by the torque converter and automatic transmissions in part), until one huge shovel loader, for instance, is controlled only by a front-back lever, foot throttle, brakes, and two levers to control lifting and digging actions. Emphasis is also being placed on visibility, comfort of the seat, protection from weather and dust.

6. Serviceability. More and more, the machines are being produced with fewer and fewer grease cups, oiling points and the like—more and more the trend is toward sealed units that require no field servicing at all. Another trend is toward making replacement parts that can be installed in only one way—with no possibility of wrong assemblies.

There are many other points that could be added: Improvements in the engines to produce greater and greater power—and the search right now for a full turbine engine that would raise the power ratings greatly without increasing size and weight; improved manufacturing techniques that permit ever closer tolerances, finer finishing and machining.

Availability

On the point of availability, there seems to be no worry.

Admittedly, the $33 billion part of the highway program will require a lot of machinery—estimates run to about $3 billion worth within the first four years of the program, and more beyond that time.

But no manufacturer feels that he won't be able to supply that demand or any other that materializes. Most started nearly two years ago to gear themselves for the demands of such a huge construction program. Several firms that weren't even in the field of construction machinery have recently entered it—and with both feet and plenty of money and knowhow.

Such demands for new equipment will also increase the demand for money—or credit—with which to buy. And still another facet of the construction industry—banks and credit organizations—is mobilizing to fill this need. There seems no doubt that both the machines and the money will be available.

Management

With the bigger and better machines has come another problem for contractors: Management.

If the efficiency of the machine is a function of the efficiency of the operator, then the operator's efficiency is a function of the efficiency of management. Proper scheduling of trucks to a big loader; good organization of haul roads and distances; best utilization of the machine is an increasing problem for managers, to insure that their investment in men and machines is profitable.

Many agencies, public and private, have been studying the problem. Such minute matters as the difference, in seconds, between greater and smaller arcs of swing for a shovel; in minutes for delays while an operator gets out to stretch his legs, or waits for a pusher to maneuver behind his scraper, or waits for a truck to come within the loading area, are of major importance in terms of money and production.

In sum

But in the end, the machines that are in use and that will come are a tribute to the contractor.

His needs, his ingenuity are the drive behind it all. Most manufacturers keep teams of engineers in the field throughout the year—just to see what new and unorthodox things the contractors are doing with their machinery. And many of these job-made adjustments become standard parts of the machines.

The contractor has much to be proud of. Much to look forward to. The pages that follow give in detail some of what's been done, and what's to come.

Then—Underpowered, small capacity dump body was tilted by hand winch, but real advance in early 1920's.

Now—Diesel powered rear dump rock body carrying loads to 30 tons, symbolizes advances.

Haulage Units . . .

Bigger, More Versatile

Some means of moving materials from one place to another—efficiently and in ever greater quantities—has always been a prime concern of the contractor. Two methods have offered themselves from early times: a wagon, drawn by some outside power source (human, animal and mechanical in that historical order), and a self-propelled one-unit machine—a truck.

(Since about the early 1930's there has been still another means—the self-loading or carrying scraper. But that development, sometimes called the greatest single development in earth-moving practice, must be treated as a separate story, and is so treated in another part of this section.)

The essential part of a materials-moving contraption have never changed: Some sort of a box that can be loaded with relative ease, be pushed or pulled or carried to a destination, and unloaded. There's nothing new about methods of unloading—horse-drawn wagons even in the earliest times could be unloaded by tilting, "bottom-dumped" by simply removing a few or all of the boards that made up the bed of the box, or by pushing out the contents through a removable tailgate.

What has changed, though, about such equipment is important: Motive power; the wheels on which the machines run; the materials of which they are made. It is difficult to put these three developments into any order of importance—they are interrelated so closely in the development of the huge and

Haulage Units . . .

REAR DUMP WAGON combines ejector mechanism with rock body for precision dumping, spreading on the run.

efficient haulers of today and those of the future.

With better steels and manufacturing techniques, carrying of all manner of heavy and abrasive loads is easy; with the great improvement of rubber tires, increases in speed and tractive power are possible; with the improvement of engines,–which has brought up to 600 hp into use for this purpose; and with improvement of driving mechanisms, power trains and the like, the contractor has at his command unparalled power to do his bidding.

Pull, push, or carry?

Just how best to move the load is a matter of some debate.–there are advocates of pulling as in a wagon, and of carrying as in a truck.

First attempts were always by carrying of course, in hods or baskets. Then with the advent of the wheel, and later of animal power, heavier loads could be pulled. With a practical internal combustion engine, in the early days of the present century, however, the wagons began to disappear from construction work–the truck became king of haulers.

Lately, though, the wagon has reappeared–in the form of a huge box this time, with capacities near 40 cu yd, pulled by powerful tractors ranging into the 400-hp class.

The question of which method to use resolves itself into the requirement of the particular job to be done.

Generally, the truck gets the nod for heavy rock work, for steep grades, or where traction is poor. The big off-the-road trucks, with their multi-axle drives, articulated bogies, get better traction since most of their weight is on the driving axles. And if space around the loading shovel is limited–as it most often is in deep cuts–the truck has the easiest time getting in and getting out.

Bottom-dump wagons pay off best in softer materials, on flatter terrain, and where haul roads are relatively good or traction satisfactory. They can carry huge loads, float over new fill, can discharge "on the run", and work especially well in big borrow pits, either under shovels or belt-type loaders.

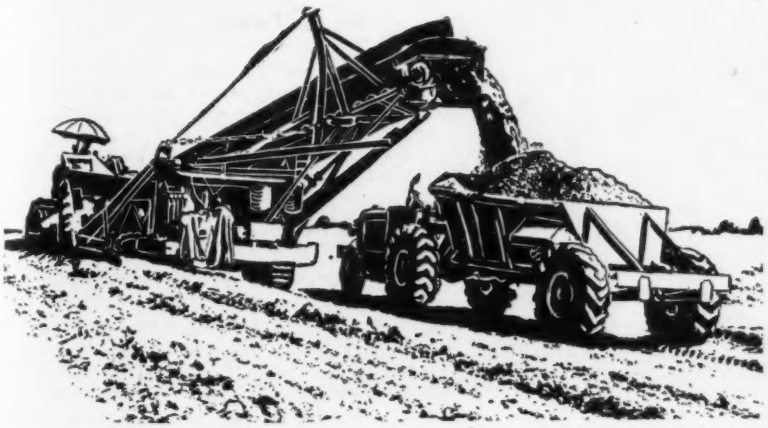
The end-dump wagons are also useful on many types of work: They can handle well-broken rock, maneuver in tight quarters, climb medium grades, and dump quickly and safely. There's a further advantage–the end dumps can be used with the prime movers that pull scrapers.

And a new type of haulage equipment, introduced recently, combines the characteristics of end-dump and bottom-dump wagons. The body can handle rough material, and it has the added advantage of an ejector mechanism that can spread the load on the run.

The trucks have an advantage, at the moment, in that they are most often transportable (if stripped down, in some instances) over the road to the next job. The wagons–principally because of their width, rather than weight–are difficult to move under their own power over standard highways. But contractors have been increasing over-the-road transport of the wagons and scrapers (at the cost of special permits from communities and states) and there are now several organizations available that do nothing but transport these machines from job to job.

In on-highway trucks, the trend is also to bigger units, with multiple drive axles–the popular sizes being 10 to 15 yd dumpers. Semi-trailers also are popular machines, particularly for hauling aggregates, bulk cement and other items. Like their off-the-road brothers, these units feature power steering, power braking, automatic transmissions with up to six speeds for extra pulling power.

ROCKER ACTION ejects load to rear by raising body on rear wheels in this version of a wagon-type carrier. Prime mover can also pull scrapers.



BOTTOM DUMP (belly dump) wagons work best with soft material, can discharge on the run, carry huge loads. Towed belt loader speeds operation.

And in the same field, the ever-present four-wheel drive cars and pick-up trucks that can negotiate the roughest terrain, are becoming most popular as job workhorses and personnel carriers.

What kind of service

Greatly improved manufacturing and engineering techniques have now developed rugged metals and rugged designs so that both the wagons and trucks can carry a variety of materials.

In addition, many special-purpose body types are coming out of the factories—built to handle materials for spreading of surfacing materials, for handling and unloading hot-mix and cold asphalt, for carrying concrete considerable distances, either dry or already mixed. Many of these can be used on standard chassis, some require their own special setup. Other attachments permit trucks to load themselves or other vehicles, serve as light-duty graders or material-spreaders.

Separately, the manufacturers of ready-mix equipment have been carrying on their own developments—most of them looking to ever-larger capacities, more complete control of mixing and unloading.

And another very special class of haulage equipment is the trailer, which transports other pieces of construction machinery (such as track-type tractors) from one job to another. Again, with the emphasis on speed and mobility, many of these are virtually self-loading, requiring no ramps or other special attachments. Some simply tilt down to form a ramp for the machine to be transported, then tilt back to roadable level when the load is properly placed.

Gasoline or diesel?

Eight years ago—at the last road show—there was considerable evidence of real competition between gasoline and diesel engines for the position of favorite for motive power.

As of today, its probably a fair statement that the gasoline engine continues to hold its own, particularly in smaller truck models (up to about 4 yd capacity), on the basis of manufacturing economies, quick starting in cold weather. In very powerful engines, however—165 hp and up to 600 hp—the diesel is virtually alone. And diesel manufacturers have developed and are improving quick starters of their own.

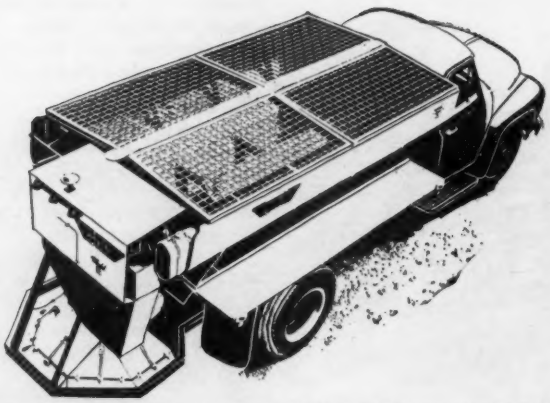
The Torque Converter

With the improvement in the efficiency of the engines—itself a function of better manufacturing techniques and better metals—have come a host of related improvements.

Chief among these improvements is the torque converter, which is, in effect, a super hydraulic drive quite similar to those on most present day pleasure cars. It takes power from the engine drive-shaft to a finned impeller, which imparts a swirling motion to a liquid. The liquid in turn drives other impellers and gearing that connect with the power train, taking the power to the driving wheels of the machine.

This eliminates the need for the many controls and parts that form the more conventional mechanical clutching system—a series of plates or gears that must be lifted in and out of contact with each other. Loss of torque, or twisting power, of the engine is less at low speeds with this system than with a mechanical clutch, and an increase

RUBBER TIRES in ever larger sizes are one principal key to the speed up and increased capacity of all haulage equipment, most other construction machinery.



SPECIAL BODIES like this one, to spread salt and surfacing material, are available for standard truck chassis.

in tractive effort is possible simply by increasing the speed of the engine through a foot or hand throttle.

Several manufacturers are now putting out models with two torque-converters, each driving an individual rear wheel, to get even more power without the added losses inherent in the more conventional rear-axel differential gears.

Other improvements in the driving train included improved two, four, and six axle drives, articulated axles to permit shorter turning radii, suspension systems that permit the wheels to ride over nearly any obstruction without disturbing the load. Considerable engineering attention is going into the problem of reduction gearing–means of reducing engine speeds of upward of 2,000 rpm to 30 or 40 rpm at the wheels. Power steering and power braking have become nearly standard equipment–and contributed a large share to making the huge present-day machines practical possibilities.

Within the engine itself, turbo-superchargers have been added to increase horsepower without too much added size and weight; power takeoffs are available to connect a variety of related equipment; hydraulic cylinders to ease operation.

Tires

As for all forms of mobile equipment, the amazing development of the tires themselves is a major part of the improvement in haulage equipment.

In the opinion of experts you can put the development of tires into three key words–Nylon, widebase, and tubeless.

Earliest earthmover and construction truck pneumatic tires were made (in the mid 30's) with cotton cord. But increasing speeds and consequent heat-buildup were responsible for many failures,–structural breakdown or heat blowouts.

Rayon, during the period 1938-1953, provided a partial answer, due to its greater strength and resistance to heat; steel mesh has also been used.

But Nylon–coming into the picture in aircraft tires during World War II,–provided the real answer. It had greater strength than either rayon or cotton, greater heat resistance, and was light in weight so that tires themselves could be made stronger with less thickness, could be more easily recapped and were more resistant to wear and cutting in the rough usage that's common on construction jobs.

As to the wider base: Standard practice in tires design has long been to use a rim about 70% as wide as the tires. New designs increase this ratio to about 85%. This permits putting within the tire casing a greater volume of air for any given diameter, so that a given load can be adequately supported at lower pressure than possible with the narrower rims.

Other results of the wider base are better flotation of the load, so that tires can get through poorer ground than could the harder, older tires; provide better traction because of greater area on the ground (as well as because of improved tread designs).

Tubeless designs–introduced only about two years ago–required a change of major proportions on heavy trucks and earthmovers, which had as many as five parts to their old-style rims. The new tires eliminated the tube and flap troubles that were said to be responsible for nearly 90% of the downtime due to tire repairs. In addition, the tubeless tires run more smoothly and with less heat; and are more easily mounted.

For the Future

In motive power, it appears that horsepower won't be increased too much–at least pending the development of a full turbine engine. But lighter and better metals, improved superchargers and turbochargers, better and simpler drive systems, promise more power per pound of engine.

As to the full turbine engine, there's a considerable debate raging over it now. Several manufacturers are experimenting with it, small ones have been built for stationary engines, a couple are now in use on pleasure-car prototypes. For construction, however, the objections seem to rest on two points: A full turbine "eats" a lot of air–and the air must be clean. The problem of cleaning it on a construction site is a serious one. The other objection is the problem of gearing down the 18,000 or so rpm of a a turbine to the 30 or 40 rpm of the wheels–and with the added problem that a turbine cannot be "idled" at slower speeds.

On tires, the newest, and as yet largely untried, development is the "barrel" type–a huge rubber bag that completely surrounds the axle from end to end. Great things are claimed for the tire: It can be powered by any conventional drive, its immense tread (full width of the chassis) gives it excellent traction and flotation, low pressures make it ride easily over most obstructions.

On trucks, bigger and bigger sizes are coming out of the factories–up to the 50-ton range; wagons are getting just as big–now on the boards are plans for a 50-yard wagon. But the limiting size requirements of even occasional operation on public highways seems to be a factor holding the size of most trucks to about their present proportions.

In all types of equipment, the trend toward simplification of controls for the operator is being boosted mightily by the new drive-trains and hydraulic and electrical "booster" equipment. Push-button operation isn't far in the future for most haulers.

And with this development is going simplification in service requirements. More and more parts of the engine and drive machinery are being made as sealed units that require no field servicing at all; numbers of greasing and oiling points are being reduced, and grouped for easy reach and to be out of the path of dirt; improvements in lubricants have cut down the number needed from as many as 23 to just three–and one manufacturer is even toying with the idea of using the same lubricant in the engine as in the hydraulic system.

Then—Steam shovel with half-yard bucket could keep line of wagons busy.

Now—Power shovel carrying 3-5 yd bucket, lifts bigger loads, keeps trucks rolling.

Shovels and Cranes

Handymen for Contractors

Second only to the tractor as the most versatile big-capacity tool available to the construction industry is the power shovel or crane. In practically all sizes, these machines are convertable, multi-purpose rigs, built to move enormous quantities of material fast.

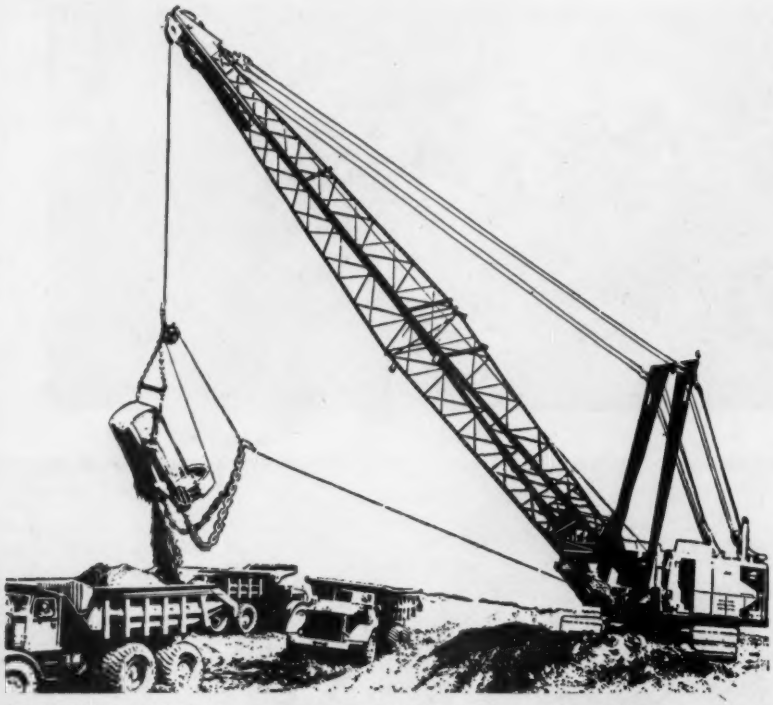
Smaller models—many of them now truck-mounted—can be converted with greater ease however from shovel to crane to backhoe, to dragline; used to move all types of materials around the job, place concrete and to do a variety of other jobs.

Following closely all other construction equipment, the demand in these machines has been for bigger and bigger capacities, coupled with greater mobility and better construction to eliminate costly repairs and downtime and to increase operating efficiency.

Older in concept than most other construction machinery, shovels were among the first pieces of equipment manufactured for power use—steam power, that is—and it is significant that steam power served long and well enough to establish the name "steam shovel" for almost every type of boom excavator in the public mind. First models, however, were either rail mounted or on skids and had to be hauled from place to place by other motive power.

It wasn't until 1914, in fact, that Henry Harnischfeger brought out the first gasoline-engine powered excavator. But from that day onward, the "steam" shovel was doomed. Only in the field of pile driving rigs, were all-steam driven machines manufactured until about 1931 (although some of these are still operating).

A list of basic improvements over the years in the boom-type machines would run about this way: adding of track-type crawlers, which freed the machines of the need of being towed or pushed at

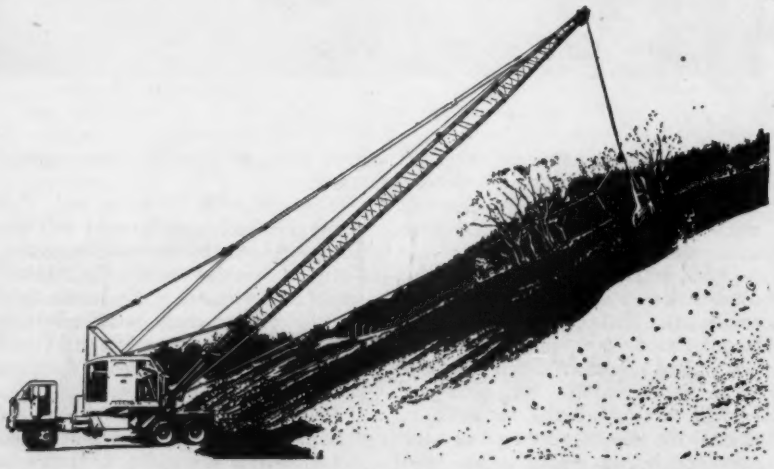


DRAGLINE, with its big capacity, usually works in hard-to-reach areas. But here it loads truck fleet in borrow pit.

the worksite; all-welded construction, for lighter, easier to handle rigs; development of hydraulic, air and electric controls that permit faster cycles—and the ever present torque converter, for smoother, more efficient power. And in addition, the diggers have benefited by the general improvements in metal-working and manufacturing in techniques—better, longer wearing metals, closer manufacturing tolerances and the like—which contribute greatly to the life and efficiency of the rig.

No easy road

It wasn't until 1934 that the first successful crawler tracks—operated by the shovel itself—were installed and operated. That properly marks the beginning of the end of the development of flat-rimmed steel wheels and half-track-and-steel-wheel combinations.



SLOPE-TRIMMING is another use for standard truck crane—here converted to dragline operation on a highway job.

But contractors and manufacturers soon found that the crawlers brought their own problems with them—some of which only recently have been solved through intensive design modifications on all the parts of the crawler mechanism. Clog-proof driving sprockets, non-clogging treads, relocation of chain drives were some of the answers to the maintenance problem.

And all-welded construction, now virtually standard on all machines, posed the problem of radically changed shop procedures for every manufacturer—and for the contractor who had to train his own mechanics.

Air controls, too, had been available for 25 years on the largest models—but how to bring them down in size for smaller rigs challenged engineers. They found an answer in smaller, more powerful units, and in making the air controls directly responsible to the operator's levers—rather than acting as an auxiliary to boost the operator's muscle-power. One result of the air power is speed; another and most important one is "precision feel of the load" that enables the operator to handle his machine with real delicacy and accuracy.

The torque converter, of course—with its ability to transfer the power of the engine directly to the drive mechanism without mechanical clutching—is especially adaptable to the excavators which habitually meet varying load conditions throughout their operating cycle. In addition, the cushioning effect of the converter (a much-magnified fluid drive system) reduces wear on cables and other parts.

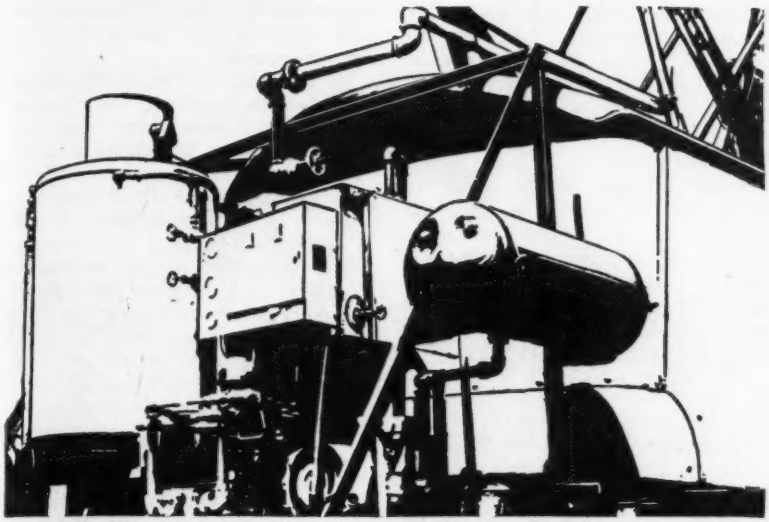
Transportability

Along with these improvements has come greater emphasis on transporting the rigs from job to job—leaving out for the moment the truck mounted units which can easily transport themselves over the road.

Evidence of how far the manufacturers have come in this regard should include the case of a 4 cu yd, 400 hp shovel that was recently knocked down, trucked 125 miles on five flatbed trailers, and reassembled in a total of three days. One 5½ cu yd model now on the market, actually knocks itself down with its own mast, and can also be loaded for transport on five trailers or railroad flatcars.

The shovels

Considering these rigs as separate types, the shovels get into really outsize classes. Four big electric rigs at Oahe Dam in South Dakota, for instance, carry 13 yard buckets as shovels, or 14 yd buckets as draglines, and have



STEAM POWER UNIT mounted on tail of crawler crane, converts crane into self-contained pile driving rig. Steam can be developed in minutes from cold start.

moved as much as 145,000 cu yd in two 10-hour shifts.

But in more normal sizes, the demand is also for bigger capacities. For some years, the 2½ yard dipper was the biggest machine on most jobs. Today, 4 and 5 yard buckets are common.

It is interesting that for rigs above 5 cu yd in capacity, there seems to be a trend toward electric power. First cost of such units is high, but they pay off in the long run because of high production with limited downtime. One of the keys to easier maintenance for the electric machines lies in replacement of swing friction parts by electromagnetic devices which control the swing drums by sending electric current to two annular fluid coils for smooth, fast—and frictionless—swing.

On the other end of the shovel scale, there's plenty of attention to small, mobile rigs—mostly for use as backhoes, cranes, and draglines. It should be noted that the small shovel for loading trucks with loose material or from a stockpile is gradually being replaced by the tractor shovel.

The cranes

Three times in the past year, equipment manufacturers have claimed honors for the highest booms on track-mounted cranes. A boom 230 ft high—made up of a 190 ft boom and a 40 ft jib—was quickly replaced by a 200 ft boom with a 30 ft jib. And the latest claim is made for a 200 ft boom with a 50 ft jib. All three booms are of relatively light construction, using hollow pipe-like members for lightness with strength.

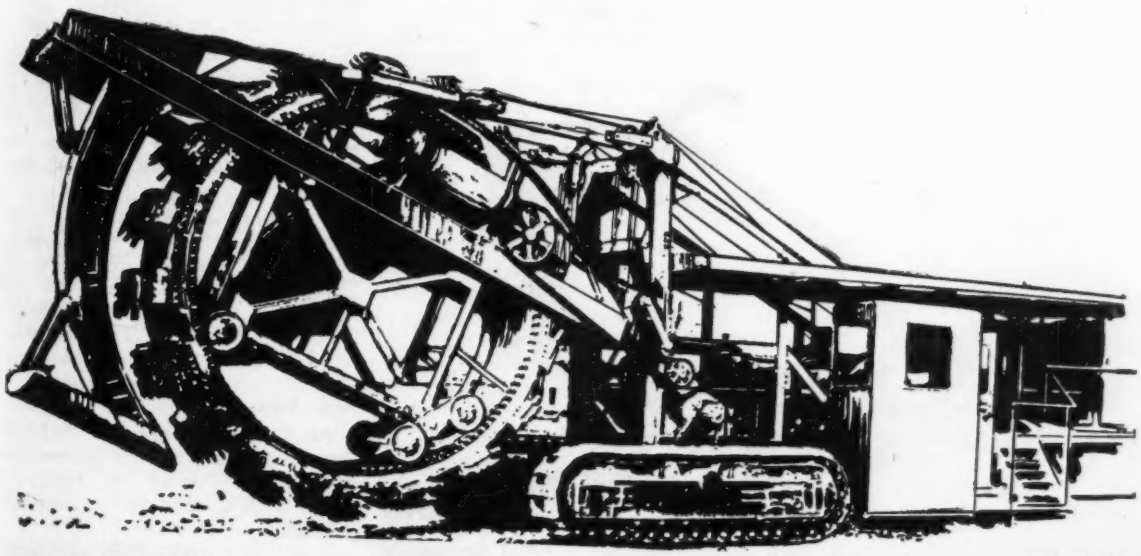
The significance, of course, isn't in how much boom a unit can carry, but in what the units can do once the boom is set. Such high booms, for instance, are given some of the credit for the increasing construction of reinforced concrete frame buildings over 16 stories high—the cranes can deliver steel or concrete for erection of structures up to 24 stories in height.

For the roadbuilder, of course, such extreme heights are seldom—if ever—necessary. But with shorter, heavier booms, and with their own mobility, the cranes he uses can erect heavy steel at considerable heights for road overpasses and bridges, lift huge concrete buckets for high pours.

The trucks

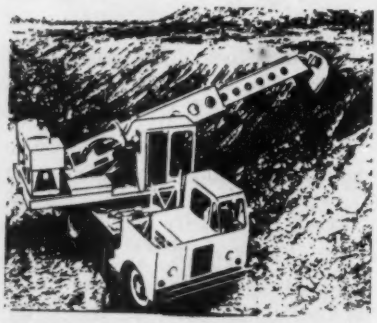
Most-used tool in this category in highway work is the truck crane, highly mobile, with great convertibility and considerable capacity.

One of the most significant developments in this equipment is that of the 25- and 35-ton truck crane. It is especially well adapted for small bridge work, and some of the moderately heavy lifts of form panels, reinforcing cages and the like. Mounted on powerful trucks, with multi-axle drives, the truck cranes have proved their worth, and their ability to get in and out of



WHEEL TRENCHERS come in many sizes—from machines to open water lines for residential developments to mammoths like this one.

TRUCK CRANE TO PILE DRIVER is a normal conversion trick.



SPECIAL PURPOSE machine is unique in the wrist-like action of its digging mechanism.

difficult spots quickly. Like most other construction equipment, they are increasingly utilized by contractors as material handling equipment, as well as clamshells, draglines, cranes.

Pile drivers

Prime example of the versatility of the boomed machines is their use as pile-driving rigs.

It is well worth noting that the pile hammer is now a vital tool of the highway builder. Once, it was considered only for the heavy waterfront contractor or for building foundation work.

The reason, of course, is the new concept of highway building—a concept that has affected many another piece of construction machinery. Highways no longer are built to skirt rivers, railroads, local streets, bad ground—they flow right over any and all obstructions, particularly in urban areas. Many of the needed structures, thus, must be supported on piles—in some cases, the actual roadway itself is supported on a swamp consolidated by sand drains, placed with special pile rigs.

These new applications of pile driving have imposed an immediate problem for contractor and manufacturer: Often relatively small numbers of piles must be driven at sites great distances apart, often in remote locations; just as often piles must be driven in congested areas, and must be driven quickly and efficiently to avoid hazards to traffic, utilities and structures and avoid delay to other operations.

To meet these requirements, manufacturers are now offering lighter, more mobile, more durable, faster-operating equipment. New hammer designs feature more favorable ram-to-net-weight ratios to pack more power into the light equipment.

Perhaps most significant advance in hammers is the diesel unit. Now manufactured by at least three firms, the unit is completely self-contained, eliminating the need for steam boiler or air compressor (and their attendant workmen) and a considerable length of hose lines. Operating at speeds and strokes dependent on pile resistance, these hammers still present problems for the engineers in determining safe loads for the piles—but they offer a means of driving piles with a slightly altered crane as a basic unit.

Another significant development in the pile driving field is the fast, compact steam generator, which provides full steam pressure in a matter of minutes from a cold start. It is lightweight, economical, automatic and efficient—and easy to maintain—can be mounted on skids, a trailer or on the rear of the piledriving rig itself.

Special machines

Within recent years, there have appeared several striking departures from the conventional crane and shovel—the new machines characterized by almost complete hydraulic operation.

One of these multi-purpose units is about as close to a human arm in operation as any mechanical device now available. Truck or crawler-mounted, its boom can telescope, swing, raise or lower, rotate, and mount a variety of movable attachments: It can dress slopes, clean ditches, place pipe, dig trenches, backfill, and handle a variety of materials particularly in restricted working areas.

Another new rig is a one-man, rubber tired self-propelled unit with 4-wheel power steering. Its 18-ft, hydraulically operated boom extends automatically, and can carry an extra 6-ft extension. Its application is as a yard crane, pipe carrier, materials handler, and form mover.

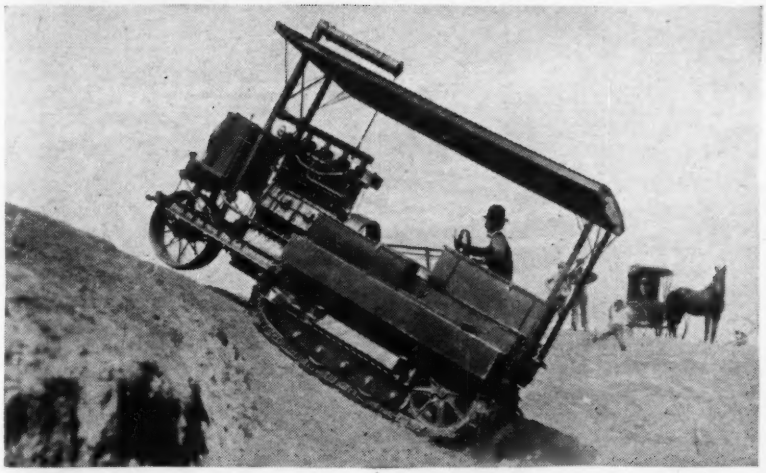
A third hydraulic machine is truck mounted, comes in two sizes—5 and 9 tons. With its short tail swing and telescoping hydraulic boom, it can poke a load into a hard-to-get-at place, provides big lifting capacity per pound of crane weight.

Trenchers

Another special-purpose tool that doesn't fall easily into any general category is the rotary or ladder-type trencher. It is, of course, an excavation machine.

Like other construction equipment, development has centered on size and

BASIC RIG—becomes backhoe for small trenching jobs. Self propelled jig transports itself from job to job.



Then—
Under the derby, Henry Holt experiments with his first front-wheel steered crawler tractor.

Now—
Mammoth crawler weighing nearly 60,000 lb claws up tough material with rear-mounted hydraulic ripper.

Tractors and Loaders

Size, speed and rubber

The backbone of any construction equipment fleet is the tractor—most versatile of all construction machines. With proper attachments it can pull, push, dig, load, hoist, and perform any number of other basic functions.

A decade ago, the 25,000-lb crawler was the basic tractor. It had few attachments, except dozer and winch, and its primary functions were pushing and pulling. The rubber-tired utility tractor was just making its bid in construction, and its applications were limited.

Today, there are more types, sizes, and models of tractors than ever before. They range from 10-hp midgets to 400-hp giants. Riding on either rubber or tracks, they can mount dozers, pusher blades, loaders, cranes, rippers, backhoes, rakes, tree-cutting blades, and numerous other attachments.

A crawler with a loader on front and a hydraulic ripper on back can quickly tear up an old pavement and then load it into trucks. It's a one-man operation. Only a few years ago the same job would have taken a lot longer and cost much more.

A small utility tractor today with a loader on front and backhoe on the rear can dig small ditches, lay pipe, and backfill with relative ease. Bigger rubber-tired units, like the self-contained loader, can travel city streets when moving from one part of a job to another. They can spend a few hours at one location loading broken pavement, move to another area and strip topsoil, and jump again to a backfilling operation.

Tractor trends, therefore, move in several directions at once. There are trends to bigness, smallness, versatility—and recently—a definite swing to rubber.

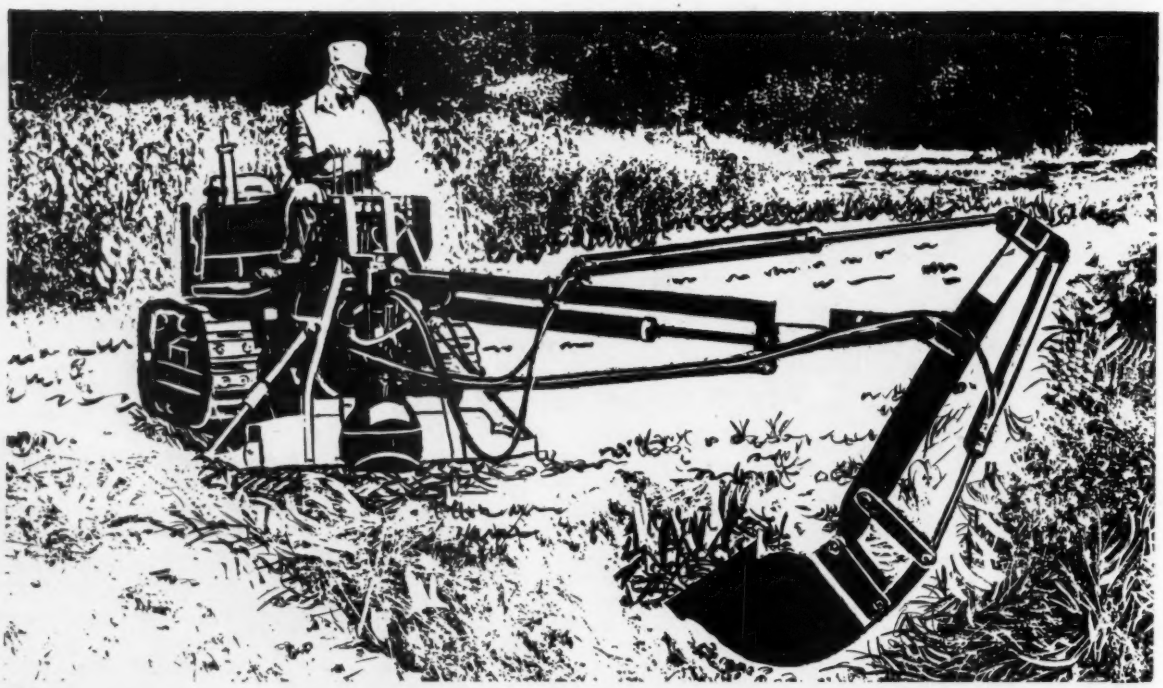
Contractors building superhighways through rural areas are calling for bigger units, more power to produce on fast, high production schedules. For these contractors, you just can't build a tractor big enough.

But other road builders, especially those specializing in urban construction. have different needs. Mammoth machines are useless to them in the maze of traffic, utilities, and restrictions of many jobs. These firms want small and medium size rigs that perform a number of tasks reliably under many and varied conditions.

The crawlers

The real workhorses of any earth-moving spread are the crawler tractors. They don't share the glory of the scrapers, shovels, and haulers, but they are indispensible tools. They push-load scrapers, spread material at the fill, cut slopes and trenches, pull rippers, maintain haul roads, push material to shovels, and perform many other vital jobs.

Crawler tractors range in weight from just a few thousand pounds to nearly 60,000 lb. In all except the smallest models, the engine is a diesel. Gasoline engines still are popular in some lines of tractors weighing less than 10,000 lb.



Small crawler tractor, teamed with backhoe is ideal for variety of light-duty jobs. Mounted also on small rubber-tired tractors, backhoes can cut trenches, clean sewers, dig foundations, excavate pits. Prime advantage is one-man operation.

The primary development in crawlers in the last ten years is the application of more power into longer and wider tracks. Engine horsepower has been progressively boosted in all models, and in some cases it has doubled. Tracks are bigger and much more rugged because of latest heat-treating methods.

The largest conventional crawler now available is powered by a single 330-hp engine. It is used primarily for pushing scrapers because it not only cuts loading time and increases loads, but also greatly reduces tire wear. The big rig can push huge masses of heavy material, climb steeper slopes than ever before, and ride high and dry through wet areas.

Models of small crawlers are numerous. Used mostly by small contractors, they mount a variety of attachments and satisfy a definite demand on landscaping and light excavation work where traction and slopes are a prime factor.

Besides the obvious improvements resulting from better metallurgy, there are a number of significant advances in all crawlers. The operator, for instance, has been given top consideration. The torque converter eliminates the problem of shifting gears; for maximum comfort, his seat is fully adjustable and cushioned. Remaining control levers are within easy reach and require only a few pounds pull. Tapered hoods provide improved visibility.

To simplify maintenance, there is a trend to unit construction:

Instead of dismantling most of the tractor to get at an internal assembly, the mechanic can now remove the offending unit without disturbing adjacent components. This type of construction has the added advantage of making precise engine alignment unnecessary.

Another improvement is in the hydraulic track tension adjustment. Instead of the tedious method of adjusting with a huge wrench, the track-chain tension is corrected by a simple hydraulic mechanism.

Improved power trains, lately with torque converters, provide efficient transmission of power to the tracks. Reverse speeds have been increased in years because of new demands on the crowler tractor, particularly in loading or pushing.

Backhoes are now also available for mounting on rubber-tired front-end shovels. High clearance assures easy operation.

Engines boosted

One of the most recent advances in

the biggest crawlers is the turbocharger, which takes waste energy from the exhaust and, by means of a blower device, forces it back into the engine to help it burn fuel better and boost power. It has the added advantage of muffling exhaust noises.

Average engine life has increased sharply in recent years, and one of the primary reasons is a new emphasis on filters and cleaners. Particles and destructive agents in oil, fuel, water, and air accelerate the wear of many vital parts. To keep engine and accessories as clean as possible, filter units have been improved considerably. And, what is more important, contractors are being educated to the importance of replacing filter elements and maintaining cleaners at the proper time. Even the best cleaning device will fail if left unattended.

Crankcase oil filters, and sometimes coolers, are mostly of the full-flow type to prevent particles from running through the system several times before they are trapped. There is also a trend toward placing the filter between pump and engine to remove particles before they can enter a vital passage.

The development of automatic seals has done a lot to extend the life of track rollers and drives. Self-adjusting seals press snugly against shaft and rollers to keep out dirt and water. They require little attention.

Striking departures from the conventional crawler include a new unit with twin 218-hp engines and separate torque-converter drives. Connected by only one transverse shaft, the tractor halves can move up and down independently of each other. Tracks can be moved in opposite directions. And the cooling system is in the rear. Another tractor has a single engine located behind the operator, and it features a special transmission that provides separate control to the two tracks. The operator has a clear view of his work.

On rubber

Although the demand for crawlers steadily increases, on many sizes of tractors, a gradual shift to rubber-tire mountings is evident.

The popularity of the rubber-tired, utility-type tractor and the self-contained loader is well established, and it is only a matter of time before huge rubber-tired tractors take over many more tasks now performed almost exclusively by the crawler. The rubber-tired rig probably will never come close to replacing the crawler in rock, on slopes, in rough ground, and numerous other types of work, but it will undoubtedly make substantial inroads.

The evolution was inevitable. High labor costs, lack of skilled mechanics, and the high price of equipment have mushroomed the cost of maintenance. And contractors know that future equipment must eliminate as much as possible the contact between moving metal parts and abrasive materials.

A new giant in the rubber-tired tractor field is a 55,000-lb machine that mounts a 13-ft 3-in. blade. This new rig has a power-shift transmission, torque converter, and planetary-wheel drive axle. A turbo-charged diesel powers the unit at speeds up to 28 mph, both forward and reverse. Rearwheel power steering permits turns while dozing, with virtually no loss of power or load.

Farm machines grow up

One of the most amazing developments in tractors in recent years is the transformation of the agricultural tractor into a first class construction tool. Today, many agricultural equipment retailers, especially those in or near urban areas, have new types of customers—contractors, utility companies, municipalities, and industrial companies.

Chief reason for the overwhelming growth of the small tractor is attachments, namely the front-end loader and backhoe. With one unit, an operator can load trucks, stockpile material, plow snow, dig trenches, lay pipe, excavate foundations, and backfill. And all at a fraction of the cost of conventional equipment.

Development of the versatile utility tractor has encountered many problems, and a number still exist: Besides the design problems of the backhoes and loaders themselves, there are even trickier questions of how to mount these attachments on the tractor. Generally, attachments and tractor

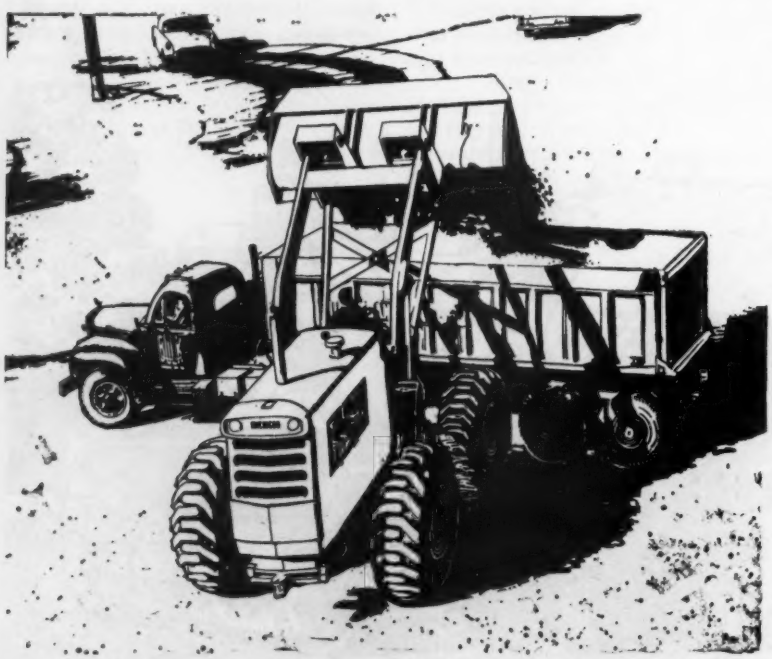
Tractor shovels are now designed more and more as integral units, rather than attachments. Bucket's tip-back action assures heaped loads. These machines are particularly well-suited for loading, backfilling, and cleaning up.

Small rubber-tired tractors, until recent years confined mostly to farm work, have caught on fast in construction.

are supplied by separate manufacturers—the industry is now making serious efforts to coordinate the two.

The problem was, of course, that the tractors simply were not made to take that kind of punishment. Originally, the machines had been designed primarily to pull a load—not carry it. The attachments now impose the strains of digging, lifting, and swinging of the backhoe, and those of the weight of the front-end loader.

Solutions include beefing up main castings, wider tires and in some cases, a full length, rigid subframe attached to the front and rear of the tractor.



Self-contained front-end shovels, like this 6-yd rubber tired rig, load fast, travel quickly, require little maintenance.

Hydraulic systems have also been a problem. In many instances the tractor's pump and reservoir capacity is too low and control values are not precise enough.

Front-end shovel

Development of the front-end tractor shovel is a major highlight in the history of earthmoving equipment.

On crawlers or rubber, it has revolutionized many types of work, all but replaced the small power shovel for truck-loading loose materials, and is excellent for cleanup work on many types of construction. It works well on backfilling, light grading, and numerous types of loading.

Ten years ago, heavy-duty front-end shovels were available only for crawlers—and they were a far cry from present equipment. In most cases, the tractor mounted an awkward frame on which a bucket was moved straight up and down. The bucket was simply pushed into a bank, the tractor backed up, elevated the bucket along the frame, moved it over the truck, and dumped. The operation was slow, the bucket lost much of its load by the time it was dumped, and maintenance cost was high.

Today, the hydraulically operated bucket with tip-back action has made the front-end shovel a superior tool. Instead of an attachment for a tractor, the unit is now being designed more and more as an integral machine. To get a heaped load, buckets tip back around 40 deg while still in the bank of material. Hydraulic systems have been improved, including bigger filtering and cooling units. And bucket capacities now range up to 6 yd.

Although there is a tremendous demand for all types of tractor shovels, there is a definite swing toward the rubber-tired unit: it can travel by itself at a good speed (up to 30 mph) especially in urban areas, and requires less maintenance. The operator has full view of the work, and the controls are simple. Traction is getting better all the time, and as newer and wider tires are introduced, the rigs will become more versatile.

• **Special purposes**—Not discussed in these pages—because the uses are primarily for special purposes such as pipeline spreads, although they occasionally have application in roadbuilding—are a whole class of special tractor equipment such as sidebooms for laying pipe, railroad rail and other materials, and winches and other equipment that can be powered from the tractor takeoff.

Then—The horse-drawn drag scraper was a fast earthmover fifty years ago—if there were enough horses and men.

Scrapers

Bigger, Lower, and Wider

Without any appreciable argument, construction men will agree that the greatest single contribution to modern earthmoving has been the rubber-tired carrying scraper.

Largely because of this machine—since its introduction as a practical production model in the early 1930's—earthmoving costs have not advanced much beyond what they were in the 1920's, despite sharp increases in the cost of labor, equipment, and fuels.

Basically only a huge magnification of the horse-drawn slip-scraper or Fresno, the rubber-tired carrying scraper of today can load itself (most often with the help of a pusher tractor), haul the load at considerable speed (up to 30 mph), and spread it in controlled depths. It can grade slopes, shoulders or a roadbed with considerable precision, or can build fill or embankment within close limits. With ever-improving design, it can also be used with a shovel or loader as a wagon, to carry and spread material.

Ten years ago, the rubber-tired tractor as a prime mover for the scrapers was just catching on. But today—except on work calling for very short hauls and in very bad ground—the crawler-pulled unit is passing from the construction scene.

Power and more power

A bit of terminology is necessary in considering the type of motive power for the machines. Actually, all scrapers are towed, but some—where the tractor section has only two wheels, and the scraper section also rides on two wheels—are in fact articulated, self-propelled units. So there are really three types of prime movers: Crawlers, four-wheeled rubber-tired tractors, and two-wheeled "overhung" rubber tired tractors.

Choice between the two and four-wheeled machines depends in general, on the length and conditions of the haul. The high-speed four-wheel machines seem to be ideal for long, unrestricted haul. The somewhat slower, but highly maneuverable two-wheel units are best for shorter hauls, in tight quarters, and, generally, in materials offering poorer traction.

To these basic types of prime movers has lately been added twin power plants in the form of fore-and-aft tractors, driving on wheels in front of and behind the scraper unit itself. A late model

Now—Dirt spills from bowl of self-propelled scraper, aided in loading by twin-engined crawler.

Pusher labors at rear end of scraper as 18-yd bowl fills, for spreading elsewhere in controlled layers. Overhung prime mover has superior traction and maneuverability, but it is not as fast as 4-wheel type.

of this type of machine, for instance, consists of a 300-hp overhung-type tractor, pulling a 24-yd scraper, and a 218-hp engine on the rear of the scraper, driving the rear wheels. With torque-converters and semi-automatic transmissions, one operator can control both power units simultaneously. The big advantage claimed is traction—with the heavy rear engine mounted right over the driving axle, the rig can climb grades and move through material impossible to a more conventional scraper, and can in some soils eliminate the need for an extra push-loader.

The diesel engines that power the scrapers are now ranging upward of 300 hp—and there are plans for machines with engines of nearly 600 hp.

Push in, push out

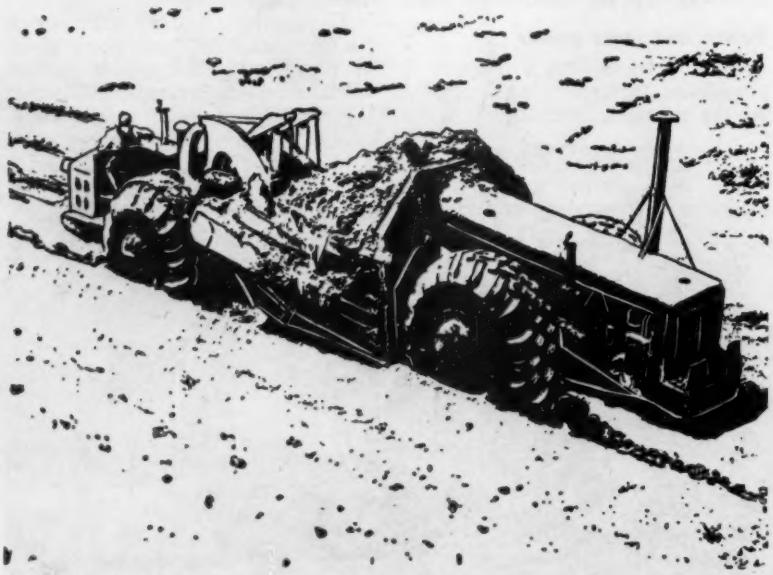
Capacities continue to rise, as contractors demand more capability from the machines. At present, they range from about 4 cu yd up to 35 yd, and again, there are plans for machines to handle over 40 cu yd.

As with the horse-drawn predecessor, the loading of the scrapers is basically simple enough—a knife-edge is pulled through the material to be moved, and the loosened earth slides back into the bowl to be carried away. Control systems for raising and lowering the bowl—and for activating the rams that push the load back out over the knife edge in unloading—vary somewhat from machine to machine. Hydraulic, cable, and electrical controls are available.

Most attention, however, has gone into the bowl itself, with the trend most strongly toward wider, lower bowls, with as little topside encumbrance as possible. Of particular interest has been design attention to the rear of the bowls—aimed at imparting a boiling motion to the material as it moves back from the cutting edge, so that large lumps are broken up and do not impede other material as it comes in. Result is a bigger load, in shorter time and with less strain on the tractor.

With the low bowls, too, have gone controls to provide a relatively high lift of the edge of the bowl, for fast travel, and for more carefully controlled unloading.

Placement of various moving parts—such as arms for raising and lowering the bowl—has been carefully studied in relation to the position of the driver; the driver's seat has been raised and placed in position for best observation of the vehicle, both front and rear, the remaining control levers placed easily to hand and foot. For quick starting of the big diesel engines, several prim-



Twin-engine scraper offers good traction in toughest materials. Torque-converter-equipped engines are synchronized.

ing systems and both electric and gasoline motors are available.

Coming soon

Although the torque converter hasn't yet taken full hold in the scraper field, several firms now include them as standard equipment, and it is likely that more will follow. Their obvious advantages, which include a considerable reduction in tire wear, as well as better handling for the operator, seem to outweigh any arguments against them.

The nylon-thread tires, of ever larger size and better tread design, offer better and better traction and flotation.

The twin-power (or fore-and-aft) scrapers haven't been completely accepted by the industry. Some contractors seem to fear increased maintenance costs, others are reluctant to buy two power units where they believe one will do—in most cases anyway. But the twin-power scrapers—in addition to their advantages in rough terrain—also seem to offer a one-unit rig useful in stripping topsoil, cleaning up, and grading, where a pusher wouldn't be economical.

Graders

Close cousin of both the bulldozer and the carrying scraper—but a machine with very special capabilities of its own—is the motorized grader.

Here is one of the most useful tools of the contractor—a big, powerful machine, but one that can be controlled with the fineness of a carpenter's fine-toothed coping saw. And the story of its development revolves around improvements in control rather than around size and weight.

Which is not to say that the graders haven't advanced greatly in power and size. Some of them weigh in the neighborhood of 20 tons, carry 190-hp diesel engines. And some manufacturers have seized on the torque-converter to give greater and smoother power.

Control the blade

But, since the grader's principal use is fine grading—and as a piece of maintenance equipment—much of the attention has gone to the problem of blade control. Means of maintaining exact levels, regardless of minor obstructions, of achieving exact tilts for proper mixing and exact levels for grading shoulders and slopes, are of paramount importance.

Some manufacturers have developed means of shifting the blade from side to side by means of hydraulic rams so adjusted that the angle of the blade is not changed. Angle and tilt of the blade itself can be controlled by precision rams, set by dials, to hairline tolerances.

Another, and more spectacular development, is an automatic control that maintains any desired slope of the blade, regardless of unevenness of terrain. Merely by setting a dial to the desired slope, an electronic device controls finished slopes to a claimed accuracy of ⅛ in. in 10 ft. The dial is calibrated in both percent slope and slope ratio. Although the operator can raise or lower the blade to control depth of cut, the slope will remain constant, regardless also of how the grader itself is affected by surface conditions.

Improvements in the metals that form the blades and controlling mechanisms have practically eliminated failure of these parts.

Control the wheels

Coupled closely with exact control of the blade is control of the steering and drive wheels. A lot of the efficiency of the blade and its exact controls depends on the maneuverability of the machine itself— its ability to get into and out of tight places, climb over obstructions, move in almost any direction.

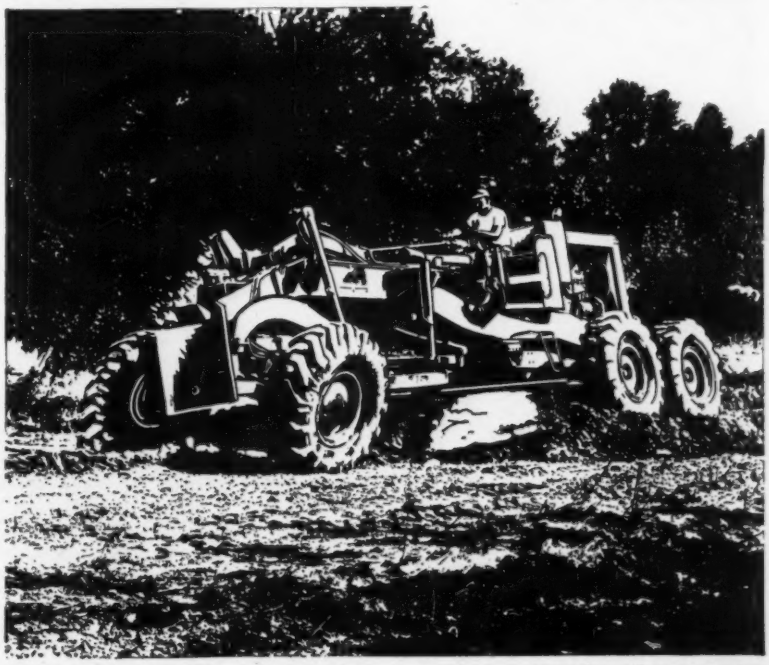
One manufacturer who has incorporated steering on all four wheels for some years, has developed a machine that has six-wheel steering, taking advantage of the more positive control of three-point contact with ground surfaces. These units also feature all-wheel drive which is claimed to deliver more power to the blade.

Because the graders can be steered diagonally, as well as in more conventional directions, they can avoid straddling of windrows, and much slippage on sloped embankments, and can turn in a very small radius.

Versatility

As with most other construction equipment, contractors have discovered that they can do a number of other things with the graders, despite the fact that the machines are essentially a special purpose unit. Light bulldozer blades, for example, are available for attachment to the front of the graders for comparatively small work; scarifiers and other attachments are also available, as well as elevating belt-conveyor attachments that can load trucks or pile material to one side.

In general, manufacturers report that travel speed has increased about 35% over the past few years; reverse speeds are up over 100%. High-traction, low pressure tires and simplified controls, new concepts of power linkage to increase drive to the wheels, power steering, are all present on existing machines.



Better controls of blade and wheels are major advances in graders. But contractors want more—like giant rig to repair haul road in single pass.

Then—Portable compressor was steam-powered unit towed by a team of horses. It led to today's highly mobile, compact rigs, delivering air at rates up to 900 cfm.

Now—Truck-mounted drill does fast job of sinking 4-in. blast holes in contractor's aggregate quarry. Compressor is set behind cab. Control panel allows operator to handle majority of functions from one position.

Drilling and Blasting

Greater Efficiency, Better Control

Since the dawn of history, men have been concerned with finding some way to cut through and remove rock. Ancient Egyptians discovered that by dipping papyrus reeds into abrasive material and then rotating the reed they could make a fairly effective drill; the Etruscans and Romans invented metal saws—some of them even with precious stones embedded in their cutting edges for greater efficiency.

Most other ancient races knew that rock could be split by alternate heating and sudden cooling with water and even vinegar (which added acid action to the cooling effect). But it was not until blasting powder began to come into general use in the early 19th century that rock removal methods commanded any scientific attention.

For some time, efforts to improve drilling and blasting techniques have concentrated on three phases: The drills themselves, power for the drills, and on explosives.

All three phases have made giant strides in the last 10 years. Today,

drills are cutting bigger and deeper holes, compressors have become more and more compact and efficient, explosives are more reliable and controllable.

Drills

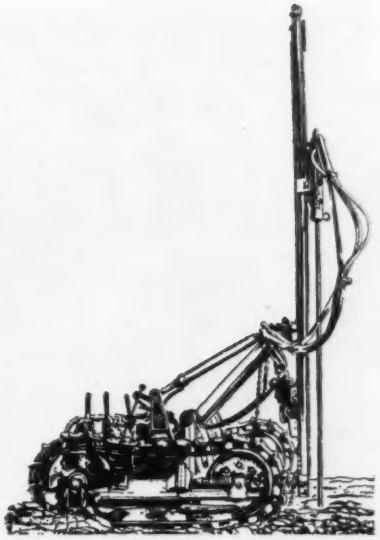
The story of the drills themselves divides into two parts—methods of drilling, and metals.

In most types of rock, the percussion drill is most efficient. It is, of course, only a magnification of the hand-operated chisel and hammer—a matter of hammering a metal bit against a rock, rotating the bit between blows in order to cover the full face of the hole.

A second basic type of drill—the rotary, with a toothed bit rotating at the bottom of a shaft powered from above—is particularly adapted for use in softer non-abrasive rock. Rotaries can drill hard rock, of course, but the cost in bits is high. To make them more versatile, several manufacturers are offering machines that can be quickly converted from rotary to percussion action.

The trend in percussion drills, however, is definitely toward greater mobility, and the drilling of bigger, deeper holes at a faster rate. This is in part the result of the contractors' desire for better production—but it is also attributable to fundamental changes in highway design, which demands smooth, level roadways, regardless of surrounding topography. The result has been bigger, deeper cuts and more frequent tunnels.

The long-honored standby of the rock driller—the rubber-tired wagon drill—



Crawler drill climbs steep grades, tows compressor behind. Air motors operate each track.

is still the backbone of drilling operations. But as the job to be done moves into ever rougher terrain, these drills lose some of their effectiveness—the machines are tough to maneuver in many areas, and their effective drilling depth is rarely more than 20 ft.

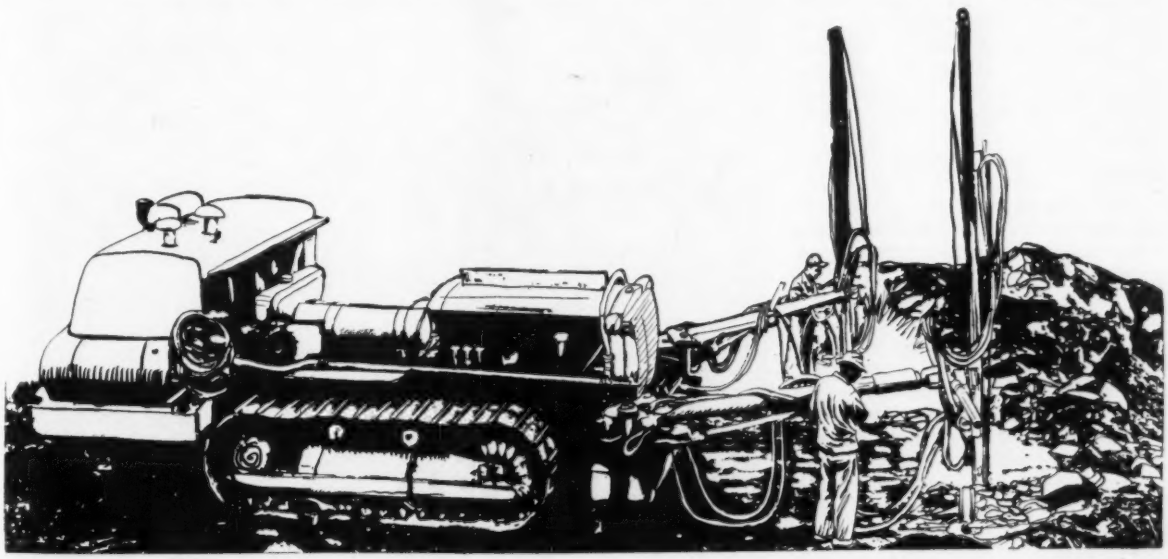
Mount 'em and move 'em

As has happened in many other types of construction equipment, the contractors were the first to see the need for better drill mobility and more power. And, about five years ago, many contractors had manufactured their own rigs, by mounting wagon drill components on the dozer arms of old crawler tractors. Some of these contractor-built machines towed compressors, others mounted self-contained units, and some provided drill power directly by connecting the compressor unit directly to the tractor's rear power take-off.

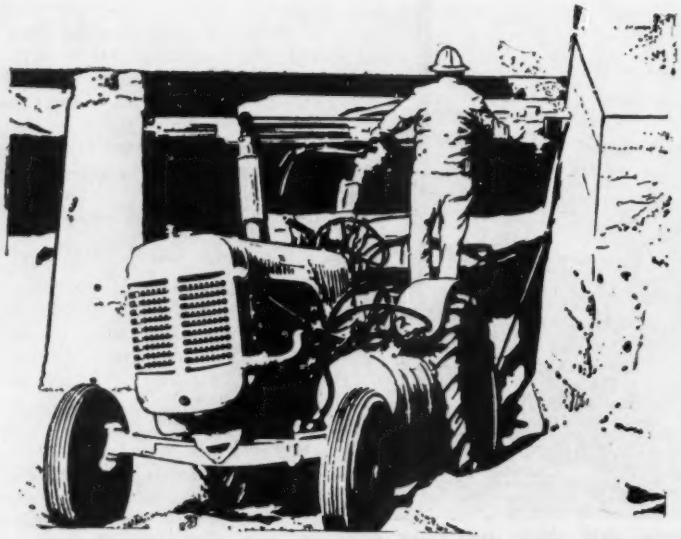
On really deep cuts, however, the road builders still searched for drills that could sink large blast holes to depths of 30 ft or more—a 4 or 6 yd shovel can pay off in big, deep cuts, but only if there was a high enough bank of blasted rock available. So contractors began to use a number of large-hole drills popular in quarry work. These worked well enough on big highway jobs, but sometimes it was found that the size of the hole drilled was too large for optimum fragmentation on blasting. And they were not practical in or near built-up areas.

The manufacturers began to catch up fast. Within the past several years, a number of firms were offering new machines—for instance, a heavy duty wagon drill mast that could be mounted on hydraulically controlled jumbo arms at the front of a crawler tractor, with a 600 cfm compressor for mounting on the back. These, of course, are more refined versions of what the contractors had built for themselves—and they work well enough in most secondary types of rock drilling and blasting.

More recently, the manufacturers have come up with a new line of drills



Tractor carries complete drilling outfit. A 600-cfm compressor on back supplies air to pair of heavy-duty drill masts in front mounted on hydraulically operated jumbo arms.



Tractor-compressor units pay off for many types of specialized light drilling. Completely self-contained, they mount drifters, pin drivers, and other types of drills.

—self-propelled crawler machines that can sink holes from 3 to 4½ in. in diameter to depths of 30 and 40 ft, can climb into position nearly anywhere hauling their compressors behind them.

Several of these machines may be called crawler-mounted wagon drills—carrying heavy drifters, operating on tracks that can be controlled independently, and with hydraulic or air control of feed, drill and carriage. They are so rugged that they can tow a 14,000-lb compressor up a 10% grade. Another is a completely self-contained rig that includes its own crawler tracks, a compressor, dust collector, hydraulic levelling jacks and even mechanical drill steel changers.

Metals

With the improvement generally in the manufacture of the steel itself has come a major advantage in time and materials saving for the driller. Special alloys have done a lot to extend the life of drill steel.

And today it is no longer necessary for the driller to keep on hand a supply of drill steels in graduated lengths for deep holes. Now, he can simply add sections as needed and continue drilling. But primary credit for this advance goes to long-life bits, which eliminated the need for frequent removing of steel and changing bits.

The development of detachable steel bits has been significant. The bits are made of better alloys, and are offered in a number of shapes and sizes. Both single and multi-use bits are available.

With the bit improvement has come the carbide-insert bit, with their tungsten carbide cutting edges that have proved extremely resistant to wear and shock. Much more expensive than steel bits, the carbide-inserts are generally more economical in hard rock work.

Large-hole drill operates new type hammer which goes down the hole with bit.

Compressors

Many construction men consider the introduction of the rotary compressor unit—around 1950—as the most significant change in compressors during the last 10 years. In general, the industry isn't completely sold on the unit—but its advantages of light weight, compactness, cool operation and minimum maintenance are overcoming resistance to it.

On rock work, the 600 cfm portable unit is the most popular, for the very good reason that it can supply power for two wagon drills. Larger models—up to 900 cfm—can handle three wagon drills, or two large-hole drills. Much smaller compressors are also available for a variety of applications—including power for saws and tampers as well as smaller drills, and some firms are now offering tractor-compressor combinations.

And blasting

Although the quality, uniformity and variety of explosives on the market has increased considerably during the past 10 years, the most significant advance has been in the control of the blast itself.

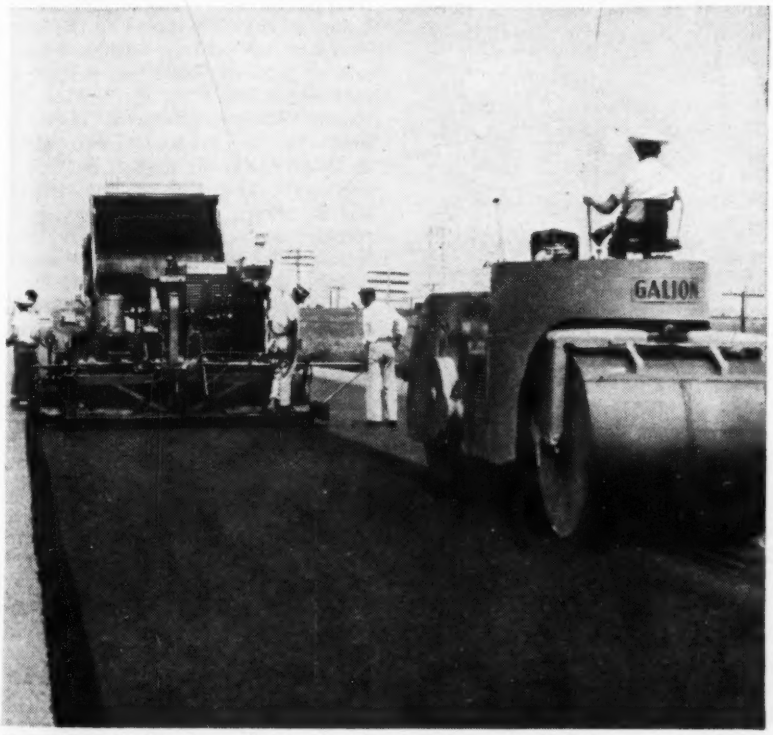
With the introduction of millisecond-delay blasting caps, the contractor obtained a method of breaking out rock exactly where and in the sizes that he wanted it—and with considerably less noise, vibration and throw. Basically, the technique is one of reducing one big blast into a rapid series of smaller blasts, obtaining maximum fragmentation by subjecting the rock to consecutive stresses.

Another advance has been in development of methods of confined detonation—or rather, of improved methods for stemming the drill holes above the point where the charge is placed, in order to prevent loss of explosive energy.

Tight stemming, plus placement of the priming cap near the bottom of the hole, produces less noise and throw, but better concentration of the energy on breaking out rock. It is of real importance in blasting work in urban areas, where noise and throw can be a real danger.

And one of the newest ideas in percussion drilling is the "down-the-hole" hammer, for deep-hole work. Slightly smaller in diameter than the bit, the hammer is mounted just above the bit and powered by air passing through hollow drill rods. The hammer thus goes down the hole with the bit, by direct drive eliminating power waste that normally occurs when power is transmitted through rods and joints.

Then—Horse-drawn bottom-dump wagon and 3-wheel steel roller, were standard when the 1909 Road Show was being held.



Now—Two-wheel tandem roller travels at high speed over freshly-laid pavement. Torque converter assures smooth acceleration.

Compaction Equipment

Vibration, Greater Mobility

Although highway engineers have widely diverging views on the mechanics of roadbuilding—there's one point on which they all agree: the need for a high degree of compaction of all levels of the roadway—fill, base, and top. Stability, resistance to permeability, and insurance against settlement are in direct proportion to the effectiveness of compaction.

In many cases, the huge tires of hauling equipment provide all the rolling that's needed. But in other situations it is not enough; the contractor must turn to a group of special machines, to complete a highly scientific operation.

Emphasis on compaction is a relatively new idea. Years ago, it was strictly a secondary function of horse and wagon teams as they moved over the fill. Later, the steam roller was pressed into service by adding bands or corrugations to its rear wheels to develop penetration. And the early crawler tractors also did their share of packing the fills.

But more specialized tools were needed. By the early thirties, the sheepsfoot roller was catching on as a first-class rig for highway fill compaction. Today, because of its excellent kneading action, it is still the standard compaction tool. Fitted with either cylindrical, shoe- or tapered-type feet, the unit is pulled back and forth across a fill until it almost walks itself out of the ground. The bigger sheepsfoot rollers are towed, generally, by crawler tractors—and this is the contractor's major objection to the machine. At the high price of present equipment and its maintenance, contractors are unhappy over what they consider the waste of a tractor on simple towing. What they want is a self-propelled machine, more universal than present compactors, capable of maneuvering up slopes and over embankments without getting stuck.

Rubber comes in

A more recent type of compactor is the rubber-tired wobble-wheel roller. It is one of the most universal compactors, because it has applications on fill, base, and top work. It works especially well in granular soils, and more recently, has been doing a good job of finish rolling on stone bases and bituminous concrete. Because it simulates traffic, it is useful in consolidating areas that will not have the advantage of normal traffic processing—such as ramps, parking areas and other lightly travelled sections.

Towed or self-propelled, the modern version of the wobble-wheel unit consists basically of a ballast box carried on two lines of oscillating axles mounting small, smooth-faced pneumatic tires. The wobble action permits tires to follow the ground contour closely. To assure full coverage of the pass, tires on the rear line of axles are placed so that they ride over areas left between each set of front tires.

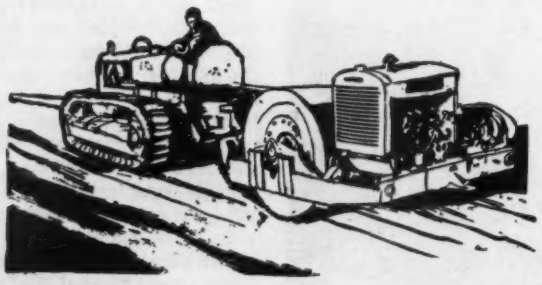
A modified version of the wobble-wheel introduced last year combines some of the characteristics of both rubber and steel wheels. Pulled by a rubber-tired tractor, the unit consists of a semi-trailer-type ballast box mounted over a single axle of wobble-wheel tires. And directly in front of the tires is a retractable steel wheel. After initial compaction, the steel roll is lowered to iron the ridges. With this machine, it is possible for a small contractor to compact and level the subgrade of a parking area, for instance, with only one unit.

More recently, this same unit was improved even further. It now offers a sheepsfoot roller that can be interchanged with the drive wheels on the tractor, and a vibrating unit so that the same machine can now be used to provide four types of compactive effort. The 60 hp prime mover has 180 deg hydraulic steering for better maneuverability.

Pneumatic triple tamper does quick job of compacting backfill in trench.

Another departure from normal compacting equipment is the grid roller. An open roll covered with a grid, or lacing of steel, the rig can be used not only for compacting fills but also for crushing in-place road fill or pulverizing old pavements.

For special types of compaction, especially on runways requiring extremely high densities, the giant rubber-tired roller has been indispensible. Built as a semi-trailer mounted on a single axle, these giant compactors are sometimes ballasted up to 200 tons. With that much weight, their primary duty is to apply test-loads.



Vibrating roller, towed by crawler tractor, offers high compactive effort for lightweight machine. It's ideal for granular soils.

New developments

Two of the most striking advancements introduced in recent years are the segmented steel-wheel roller, and the vibrating compactor.

The segmented-wheel units are popular in certain non-granular soils because of the tamping action of their feet, and because they are self-propelled. They work best in non-clogging materials, and where grades are not steep.

A more radical departure from earlier conventional units is the towed vibratory roller. Relatively light cylindrical rollers, they greatly amplify their deadweight compactive effort by vibrating while in motion. They work especially well in soils with low cohesion factors—sands and gravel fills and crushed stone bases.

Vibration has two measurements: amplitude—the maximum vertical force imparted to the soil particles; and frequency—the actual number of oscillations (impacts) per second.

The vibration is imparted by constant speed, revolving weights within the roller drum. Power is supplied by a gasoline engine mounted on the unit. Weights can produce vibrations at a rate of between 3,600 and 4,500 per min, depending upon the size of the roller. These high speeds of vibration reduce any tendency for the roller to "hop" under the impact, but in addition, the weight of the machine itself is enough to hold the roller in constant contact with the surface, thus forcing the vibrating action downward through the surface and subsurface.

One desire has been voiced by contractors, however: They want bigger and wider machines of this type than so far are available.

Another type of towed vibratory roller rides on rubber tires. A vibrating unit driven by a gasoline engine imparts 700 to 1,400 cycles per min directly to the rig's single axle. Rate of vibration can be varied to suit different soil conditions.

Base compactors

Standard unit for stone base compacting is the three-wheel roller. It has two high and relatively narrow steel wheels in back and one low and wide wheel in front. Weighing between 10 and 20 tons, these units dominated the scene until recently when the self-propelled, multiple-shoe, vibrating

Self-propelled compactor passes electrically vibrated shoes over stone base. Shoe-type units have gained wide popularity in recent years because they are simple, do a thorough job of keying stone base, and can be modified to suit many conditions.

units were introduced. In a few short years, these machines have replaced the three-wheel roller for initial base rolling on many jobs.

Vibrated either mechanically or electrically, the multiple shoes pound the rock at a machine-gun tempo, keying the base materials together and forcing choker dust deep into the voids. Often the rigs are operated in echelon to cover the full width of a road in one pass. Another advantage is the flexibility of shoe mounting. Shoes can be fixed to compact slopes, ditches, and many other odd-shaped surfaces.

Finish rolling of bases is accomplished most often by tandem steel wheel rollers.

Surface rolling

Smooth steel-wheel rollers are now limited almost exclusively to base and top compaction. There are two basic types—the three-wheel and the tandem. As mentioned before, the three-wheel unit, because of the excellent crushing action of its heavy rear wheels, is best for rolling base. The tandem unit works well on base, but also does an excellent job on bituminous concrete. These units range from miniature one-ton models for driveway work to 20-ton machines for laying turnpike pavement. Tandems are often preferred for finish rolling because the rolls follow directly behind each other, eliminating the ridge that sometimes results from a three-wheel unit.

The popularity of the three-axle tandem has grown steadily because it works so well on so many applications. Besides a main drive roll in the rear, there are two guide rolls in front with syncronized hydraulic steering.

Key feature of the three-axle tandem is the transfer of weight to any roll that is riding a bump. On some models ,the rigid connection between the twin guide wheels can be unlocked for a more even distribution of weight, regardless of ground contour.

Smaller models of the two-axle tandem, especially those around 6 tons, are very popular with the small contractor. Mobility is the secret of the small unit, and to accomplish this most manufacturers have built in retractable wheels to facilitate towing.

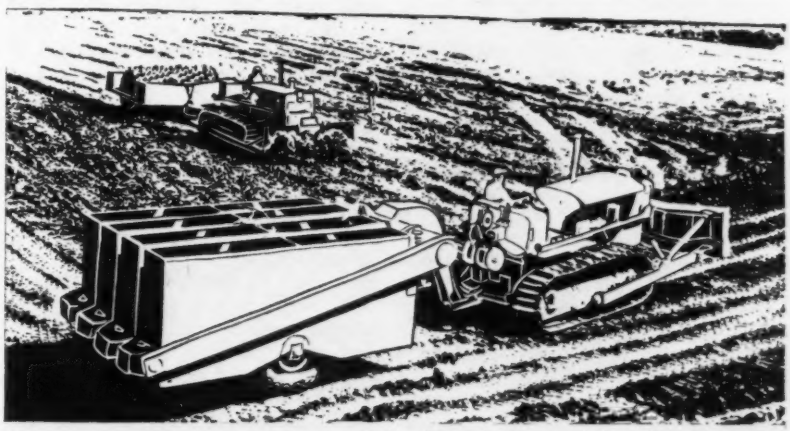
A special-purpose unit gaining new popularity because of extensive road-widening programs is the trench roller. Latest models have two steel wheels which can be adjusted to cover the full width of the trench in one pass. Leveling wheels ride on the pavement.

Primary advancement in steel-wheel rollers is the torque converter. By eliminating gear shifting, the unit provides smooth starts and stops, producing a better finish.

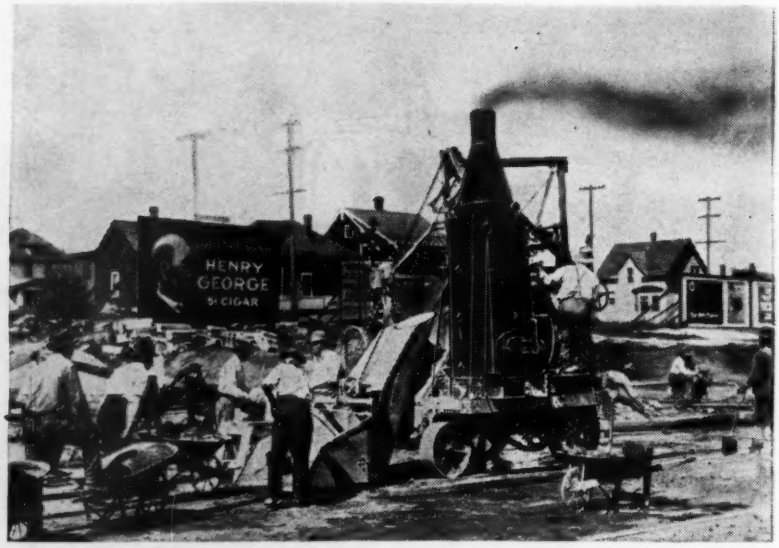
To handle the multitude of compacting conditions in restricted areas, against walls, in ditches, and around manholes, a number of hand-operated power tampers have been developed. Most common is the single and multiple pneumatic unit powered by compressors.

More recently, a number of self-contained units have been developed. One type operates by jump pounding.

Hand vibrating tampers are also popular. Powered mechanically or electrically, the plate or foot vibrates at frequencies of several thousand cycles per minute. Some are "walked" by hand and others are pushed or wheeled.



Heavy compactors cover fill systematically. Big rubber-tire and sheepsfoot units must be towed by crawler tractors.



Then—In the days of the 5¢ cigar, steam-powered mixers rode on steel wheels, were charged by wheelbarrows.

Paving Equipment

Better controls for batching, mixing, and finishing

The most obvious part of a road is the pavement—a surface of some kind over a path that leads from one place to another—something to keep men and machines operating despite the vagaries of the weather.

But when you talk about paving, nowadays, you begin at a point well below the surface. And so you must consider all manner of machines and operations that have as their combined result one thing: A good, smooth, hard surface that will stand up under wear and weather.

With the increasing dependence of a nation like the United States on its motor transport, the old ideas about how to build a road began to develop serious gaps. The fact was that the roads weren't standing up, they were rutting, they were rough, and they wouldn't permit fast travel.

The answer—and it is of comparatively recent discovery—was finally found in considering what lay under the surface. The base and the sub-base under the road would control the surface, no matter what it was.

To prepare the sub-surface, a whole host of machines has been developed or adapted: The scrapers and 'dozers; the tampers and all manner of other compaction equipment; the special truck bodies, the various kinds of mixers. Most of these are of such special nature—or belong so clearly to a family of equipment—that they are treated separately in other sections of this special report.

A rock crusher, however, cuts across the field—whether it produces stone of the right sizes for a sub-base, or aggregate to specifications for a concrete or asphalt mix. Without these machines in their present state of development, and the screening plants that separate and grade their product and many of the finely-graded mixes now being called for by the engineers would be impossible.

Break 'em down

Since man first began to try to shape his world to suit his own convenience, he's had to cope with rock—some means of reducing it to manageable sizes and weights. Lately the problem has been complicated by the need to bring it to exact sizes for aggregates of all types.

Methods evolved by earliest builders remain basically the same today—you can crush the rock, break it with a hammer, grind it down. What modern manufacturers have done is add immense mechanical power to these processes.

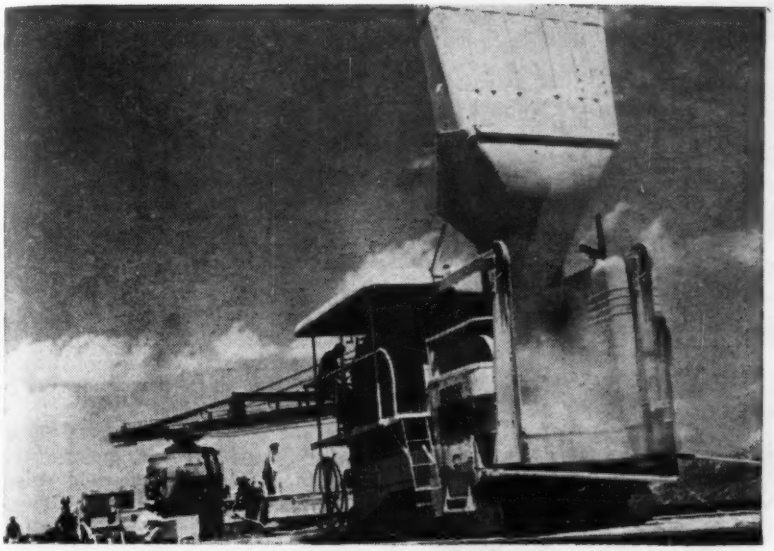
Today, there are four basic types of crushers in general use: Jaw-crushers, roll crushers, gyrating or cone-type crushers, and the impactor and hammermill. The names are quite descriptive: The jaw-crusher works on the principle of the human jaw, with one jaw movable, crushing the rock against an immovable second jaw. The rolls take the stone between them and reduce their size by crushing; the gyrating or cone-type crushers work on almost exactly the principle of the chemist's pestle-and-mortar. The hammermill uses a series of metal sledges to shatter and crush the rock.

The jaw and gyrating crushers are generally used to crush larger, harder rocks down to fairly coarse sizes, the rollers and the hammermills to take smaller rock and bring it down to sizes well below 1½ in.—right down to pea-size.

What's happened to the crushers, from the contractor's viewpoint, though, could be put in two points:

Size of the basic machine has been progressively reduced and mobility added so that instead of a huge, stationary monster usable only in a fixed quarry or gravel pit, the machines—mostly on rubber tires—can now be moved from job to job and to convenient locations on the job.

Versatility has been increased by combinations and refinements. Manufacturers have combined several different crushing operations—such as jaw-crushers and rolls—so that a single machine can handle several kinds of rock, both as to size and hardness. Double and triple roll setups are available.



Now—High-capacity, self-propelled, engine-powered paver mixes concrete automatically, spreads it neatly.

Additionally, through combinations of the crushers with screens and other devices the rock can be separated to various sizes, down to sand and gravel. And the combination of the crusher with belt conveyors and screw and bucket conveyors make it possible also to move and load the material.

Asphalt paving

A number of machines have been developed to speed up and make simpler the job of preparing base and sub-base.

Most popular for recent years have been box-like devices mounted on the dozer arms of crawler tractors to put down accurate lifts of base materials. Trucks empty directly into the box while the spreader pushes them ahead. Adjustable wheels permit accurate thicknesses of material. Lately, however, some contractors have felt that it involved the "waste" of an expensive tractor. And from this has come the development of self-propelled spreaders, mounted on crawler tracks, that can spread base materials up to 16 ft wide and 20 in. thick. An oscillating V-type screed at the rear of the machine levels the material as the spreader moves.

Asphalt plants

Asphalt plants have also come a long way in the past decade.

In general, the changes can be stated this way: The asphalt plants are getting bigger, a 6,000-lb capacity plant is now common; they are being equipped with nearly complete automatic controls to handle all operations; they are being made portable (in knocked-down form); they are being equipped for electric power to cut down maintenance, weight; and they trend to batch-type plants, especially where highest-type pavements are required.

Some contractors are now leaning toward the conveyor and reclaiming tunnel methods of feeding aggregates to large batch plants, rather than by the long-conventional clamshell loading a feeder-hopper. The conveyors give good control in proportioning aggregates, cut breakage from handling, and allow the plant to switch quickly from one specified mix to another.

Methods of heating the asphalt plants have also seen some recent changes. In order to keep the asphalt plastic, storage tanks, pipelines, metering devices, weigh buckets, pugmills and fuel oil systems have long been jacketed for heating—normally by steam. But in recent years, there has been a wide swing to hot-oil systems, eliminating the need for a large steam boiler, with its accompanying problems of maintenance, safety, cost, water supply. The hot-oil systems operate from a single heater, circulate oil through the plant. Electricity is also being used as a heating system. Electric elements heat the tanks and pipelines, and an electrically-heated hot-oil system handles the weigh bucket, and pugmill.

Another problem—operating a big asphalt plant close to built up areas—has been solved by improvements to dust collecting systems. Water-type filters can remove practically all fines and reduce exhaust to steam and little else.

The asphalt pavers—also attended by trucks, but followed usually only by rollers—are another story. Their raw material is delivered directly by truck from the asphalt plant, and they run on their own tires or tracks directly on the prepared base, laying the finished surface behind them.

Ingenious manufacturers have incorporated such features as a heated, vibrating strike-off blade at the rear of the machine to "iron out" wrinkles in the pavement and compact it firmly. Used in echelon these machines can lay an entire surface for a superhighway in one pass—except for rolling.

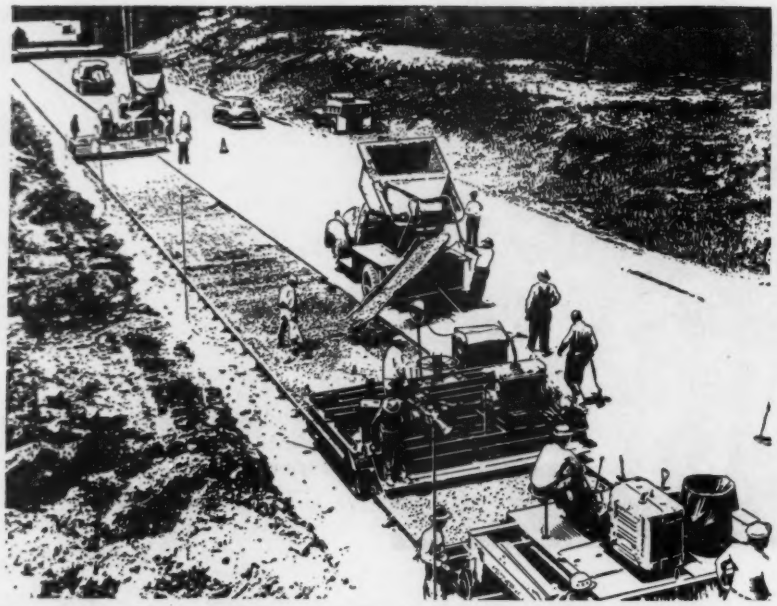
The crawler-paver can outclimb the rubber-tired models on grades, but the speed possible with the rubber-shod machine makes it popular.

Concrete batching

Probably least dramatic—from a spectator's viewpoint—but one of the most important developments in paving practice has come in the field of concrete batching plants.

Again the basic problem is simple enough—storing the right-size aggregate, the cement, and additives in a convenient place, and delivering them in the right quantities when needed. The basic answer is equally simple—a hopper type bin controlled by some sort of a gate.

But to this basic concept have been added two things that change the picture radically: Mobility, which makes it possible to bring the bins quickly to the job; and extremely accurate controls—mechanical, electrical, even electronic—which make possible the accu-



Paving spread gets concrete in special dump bodies hauling plant-mixed concrete to job site, chuting it in front of finisher.

rate proportioning now required by engineers.

None of the portable units are electronically equipped as yet, but most companies have equipped their bins with mechanical controls and scales with the accuracy of a fine watch that weigh out many sizes of aggregate, and cement, at one time, discharging them into trucks for transport to a paver at great speed. Improvements in the controls have rapidly cut down, also, on manpower needed to operate the bins, batchers, and mixing plants.

Electronic controls have begun to appear on these plants within the last two years—exclusively, at the moment, in large stationary plants such as ready-mix concrete headquarters operations. But applications of these controls are sure to come for field installations.

Batch plants charged by clamshell accurately weigh and record aggregates.

Leading the paving spread often are small tractor-compressors which supply air to pin-drivers to make a quick job of anchoring forms. Small trucks and self-propelled cranes, of course, speed handling and setting of steel and forms.

Behind them, fine-graders ride the forms prior to the concrete paving operation to remove excess material. They are still popular—but some contractors are beginning to show preference for finegrading attachments for graders, that permit the grader blade to follow the forms in order to fit the depth of cut. At the moment, removing this excess material is a problem most often handled by a front-end loader—but in the future, attachments may be developed to permit the grader to do the whole job.

Concrete pavers

Important as are the foregoing units, the machine that most quickly means "road" to most observers is the paver itself.

In concrete work, the paver (with one exception) is nothing more than a self-propelled concrete mixer of comparatively large capacity (1 to 3 cu yd), equipped with a discharge bucket that can be moved on a boom to deliver concrete to the desired location.

Usually working off to one side of the area being paved, the paver is attended by trucks which deliver water and aggregate-cement. It must be followed by a train of special machines that strike off and consolidate the concrete, smooth it, and put on finishing touches.

There has been little basic change in the paver over the past 10 years or so—but there have been numerous improvements. These include hydraulic controls to speed batch transfer, operation of the discharge chute and bucket spotting; automatic batch controls that allow the operator to spend more time on other activities; improved gates on buckets for gradual opening and thus better control of spreading. All pavers today are designed with reduced heights, to permit them to crowd under bridges.

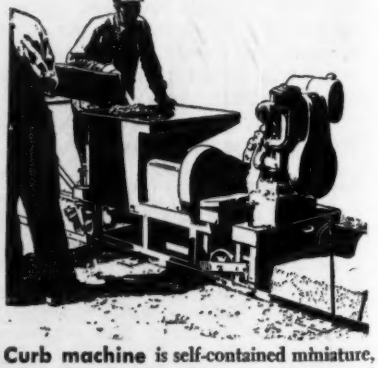
Most revolutionary development in the line of pavers is probably the so-called "formless paver" that combines within itself the functions of striking off, smoothing the concrete (though the machine is still served by an offside mixer), and additionally, carries its own forms trailing behind it far enough to let the finished concrete set sufficiently to maintain its shape.

And under certain conditions there's competition for the pavers—in the form of the ready-mix trucks which can deliver as much as 10 yd at a time, directly into the forms, and of special truck bodies of considerable capacity that can take mixed concrete directly from a central plant and deliver it—without further agitation—to the forms.

Concrete finishers

The train that follows the concrete paver is a fascinating procession of machines that are today uniformly more powerful, faster and more mobile.

Riding the steel forms, these machines can handle single or double lanes at one time, spread the concrete evenly (some using vibratory equipment) without splashing it out of the forms; screed



Curb machine is self-contained miniature, taking concrete from hopper, vibrating and forming, moving under own power.

Three asphalt pavers working in echelon lay 36-ft wide roadway surface in single pass. Rollers follow closely behind.

the concrete smoothly; form dummy joints; and spray curing compounds on the finished surface.

Concrete spreaders are now being improved to spread the concrete more smoothly and quickly, without splashing it outside the forms, and these same machines also tow or mount various types of vibrators—with power-generating equipment mountable on the spreader.

And of course, some hand operations are still required—men with the old-fashioned "bull float" still follow the machines in many cases to give a final finish. On the finishers, contractors report one feature that still needs attention: Because of their eccentric-type drives on the reciprocating screeds, there is a "throw" at the beginning and end of each cycle, which produces surface irregularities in the concrete. Some manufacturers have experimented with hydraulic and improved mechanical drives to eliminate this condition. Some models now available can widen themselves to handle ramps and other areas where lane widths are variable.

Generally, the last form-riding machine is the paving train is the curing machine—a unit of fairly recent vintage. Self propelled, this machine carries a full drum of curing liquid and a reciprocating nozzle that sprays the liquid uniformly on the concrete. Often, a broom travels on a transverse belt at the front of the unit, to apply texture to the finished concrete.

Another development for concrete paving is the self-propelled powered saw. In their search for speed, builders have discovered that it is easier to put down the slab in long continuous sheets, sawing joints after the concrete has set to some extent.

And, for use in both concrete and asphalt paving, numerous small machines have been developed to lay curbs and guters. Self-propelled, moving either on the forms or on their own wheels, these machines are miniatures of the paving operations, though usually handling within themselves the operations of vibrating and screeding.

In all, however, the main development in the paving operation has been more than any individual machine—it has been in the development of closely coordinated teamwork between the machines. Split-second timing of truck operations, increased capacities and accuracy of the batchers and mixers, closely-spaced operation of preparation and finishing machines are the key to successful, economical operation.

The manufacturers are concentrating to an ever greater degree on this phase—speed and accuracy.

Secondary roads paving

In any discussion of roadbuilding on a nation-wide basis, it must be remembered that by far the largest part of the more than 3,300,000 miles of improved road in the U.S. are low-cost improved surfaces that must be maintained, strengthened, widened, to carry increasing traffic.

To do this job, a special group of machines and attachments have been developed.

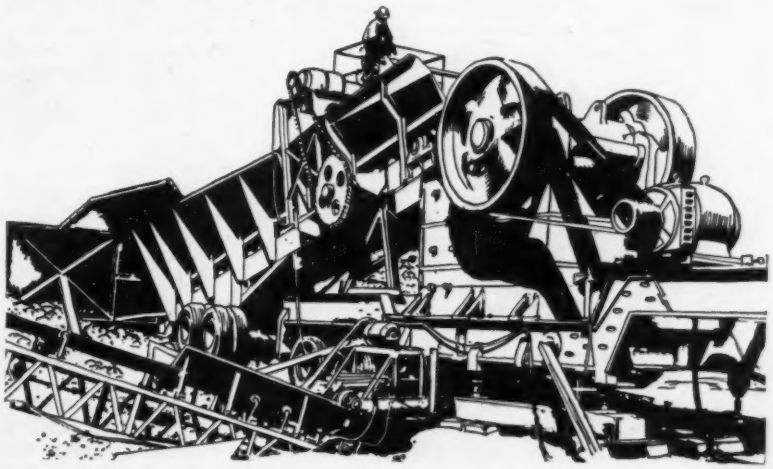
Most of this equipment is designed for mixed-in-place pavements, which require no sub-base or base preparation, and which require machines capable of handling a wide variety of soils and aggregates on the road, rather than after processing in a stationary plant.

One machine in this class, for instance, picks up aggregate from a windrow, mixes it with an appropriate binder, and deposits the resulting material behind it in windrows, or spreads it to a required thickness.

Another, more elaborate, usually follows a bucket loader, receives aggregate into a hopper, mixes with a binder, and spreads behind.

A third type—perhaps most popular, mixes aggregate and binder under a metal hood, without elevating the material from the ground. In this machine—if liquid binder is used—it can be sprayed directly into the mixing chamber. If the binder is a mineral (such as loam, dust or cement) the binder is first spread over the surface to be prepared, mixed as the machine passes over it.

And of course, the standard tools of the municipal highway maintenance crew—the grader, the small dump truck, the stockpile of ready-mixed materials, and the hand rakes, shovels, small compactors and rollers, hand tampers and the like, are always present in the inventory.



Portable feeding, crushing, and screening equipment allow contractor to shift operations quickly from job-site to job-site.

Miscellaneous Tools

Power Replaces Muscle

Then:

Construction work was manual labor—human and animal muscles supplied power on every job.

Now:

The workman is still very much present—but his muscles are supplemented by machines that do the work faster, better.

Nothing better demonstrates the American philosophy of doing more work with less men and less effort than the field of small tools. And nothing so pleases the heart of the U. S. craftsman—amateur or professional—than the small, incredibly rugged, extremely versatile machines that have been developed to increase the skill and power of his hands.

Not much historical background is needed for understanding here: The ingenuity which invented the cotton gin and the constant search for labor saving are the spur behind the development of the tools. And, as in much larger machines, of course, developments in metals, lubrication, power units have contributed heavily to the qualities available at the flick of a switch.

None of these small tools is in the exclusive domain of the highway contractor—their very versatility insures that they will appear and reappear in every form of construction.

Power sources

You can make a logical beginning in a bewildering field by starting with the sources of power used. And that immediately brings into the picture the ubiquitous small gasoline engines, which can be found noisily put-putting away on any construction job, busily supplying standby electric power, driving small compressors, powering small concrete mixers, vibrators and the like, driving pumps of both centrifugal and diaphragm types, driving motorized buggies and other equipment.

Manufacturers turn out these little engines by the hundreds with horsepower ratings running from less than 1 hp up to about 6. One cylinder, in most cases started by a pull-rope, the little machines are amazingly rugged and because of their simple construction, seemingly can run efficiently under the most adverse conditions, with a bare minimum of attention. All are air-cooled, use finned cylinders and heads—most often of cast aluminum—and are readily repaired with almost no other tools than screwdrivers and pliers. Usually built to drive other equipment—such as small concrete mixers—through belting, they can also be converted to direct and gear drives.

Heavier engines—such as those made for portable standby power plants and compressors—run into much greater horsepowers, of course, and really heavy ones are diesel powered.

The word portable, of course, can be stretched considerably. The little gas engines may weigh anywhere from 20 to 70 lb, and are easily transportable by hand. Some travel on wheels or specially built wheeled carts.

Nevertheless, the availability, power, and stamina of the engines makes power—either air, electric, or direct drive—available to a contractor any place, regardless of location and proximity to more conventional sources.

Saws, drills, hammers

Universal to the construction industry are the power saws—table-type or hand-held, but in most cases electric powered. (Brush cutting and tree-cutting saws, however, carry their own gasoline engines—and the whole weight of engine and saw isn't difficult for one man to handle.)

But with greatly improved motors, and great improvements both in the metal and the setting of blade teeth, the saws are an essential tool for any formwork and for many other operations in roadbuilding.

Probably most versatile tool in the small-tool category is the powered drill, taking bits from one-quarter to a full inch. With its many attachments, this machine can drill holes in wood, stone and steel; become a saw for light cutting; be used as a buffer, grinder and polisher; drive screws and bolts; can supply power for some kinds of vibrators, and for various grinding, and teeth and bit sharpening devices.

In this same category fall a family of other tools—though some of them are specialized to such an extent that they won't be considered separately here. But to be included are such items as the powder-actuated rams for setting studs and other devices into concrete and metal; the air-power wrenches and augers; welding equipment of all types; clay knives or clay spades for excavation work; saws for cutting concrete and stone.

Pumps

Of special interest to the highway builder are the pumps most highway jobs seem to require—for bailing out ground water or heavy rainfalls, for drying—and keeping dry—excavations, and for many other purposes.

Much has happened to the pump since the first bucket was dropped into the first well or pond, and much is still happening. Primarily, what's happened has been the application of power to the operation, reduction in size, and the development of two high-capacity types: The diaphragm and impeller (or centrifugal) pump.

In thumbnail, the diaphragm pump, by positive action of a tightly-sealed piston, creates a vacuum that sucks up water and air from the reservoir and discharges it. The centrifugal pump creates a vacuum that darws in the water by the spinning of vanes on an impeller.

The diaphragm pump will work without priming—filling the chamber with water or other liquid to provide a perfect seal so that the vacuum principle can work—but it works better and more quickly if it is primed. The centrifugal type won't work without priming. Development of self-priming attachments—basically a water reservoir that is refilled by the pump once it begins to operate—have vastly increased the efficiency of the units.

Capacities are high on both types—running from as much as 65 gpm (at 15-ft head) for a 2-hp unit up to more than 2,100 gpm with a 42-hp engine. (With greater horsepower, bigger pumps can reach into the 200,000 gpm class). Rugged and built for trouble-free operation, the pumps can be pushed, towed or carried to almost any location, operate independently of any other source of power but their own engines, and pump amazing con-

Stud driver, powered by explosives, anchors decking, wall panels, and numerous other materials.

Two-way radio brings all parts of highway job in close communication.

glomerations of earth, sand, clay and organic material along with the water, without apparent damage to themselves.

Vibrators

To make sure that concrete fills all the space within a form, and to meet low-slump specification requirements, contractors on every form of construction have made increasing use of vibrators. More, they've discovered that the little "wigglers" can also be used to move considerable quantities of dry material—like stockpiled sand and gravel—without the aid of muscles.

Essentially, the vibration is applied in the small head of the machine by one of two means: An eccentric gear which throws weights to one side or the other, creating a rapid wiggling motion in the flexible head; or by a ball, pushed by air pressure, running at great speed within a raceway. Various types of heads and weights being available, depending on the material to be vibrated—in light material, some of the machines can attain as many as 12,000 oscillations per min.

The principles of vibration, very particularly in connection with concrete paving (though, as noted in another section, also on asphalt pav-

Concrete grinding machine is powered electrically through a flexible shaft. It's faster and cheaper than hand rubbing.

Electric vibrator is lowered into foundation form to help consolidate concrete.

Reciprocating saw, powered by gasoline engine, quickly slices through plank. Lightweight unit boosts man's daily production.

Power drill accurately cuts deep holes in concrete wall.

ing) have been carried, of course, to much larger machines than the hand-operated ones. Some of these can vibrate the full 13-ft or more width of a concrete slab at one time.

Other units

The list of other smaller equipment that can be adapted to the use of the roadbuilder is almost endless. It should certainly include "packaged weather" units to provide up to 300,000 btu per hour of heat to keep engines from freezing, keep isolated workshops at comfortable temperatures; cleaning and washing appartus, and a whole host of machines for maintenance purposes.

And certainly, also there should be included some consideration of radio communications which make it possible for one man to supervise several miles of construction work, travel the job, and never be out of touch.

What's ahead?—As in all other categories, the main thing that's ahead for these tools can be listed quickly:

Greater versatility; more and more power in smaller packages; better materials for longer-lasting machines; more and more independence of outside or fixed power sources.

Impact wrench is ideal for turning up studs in engine block.

Pneumatic device breaks tire bead from steel rim. Many tire tools are available.

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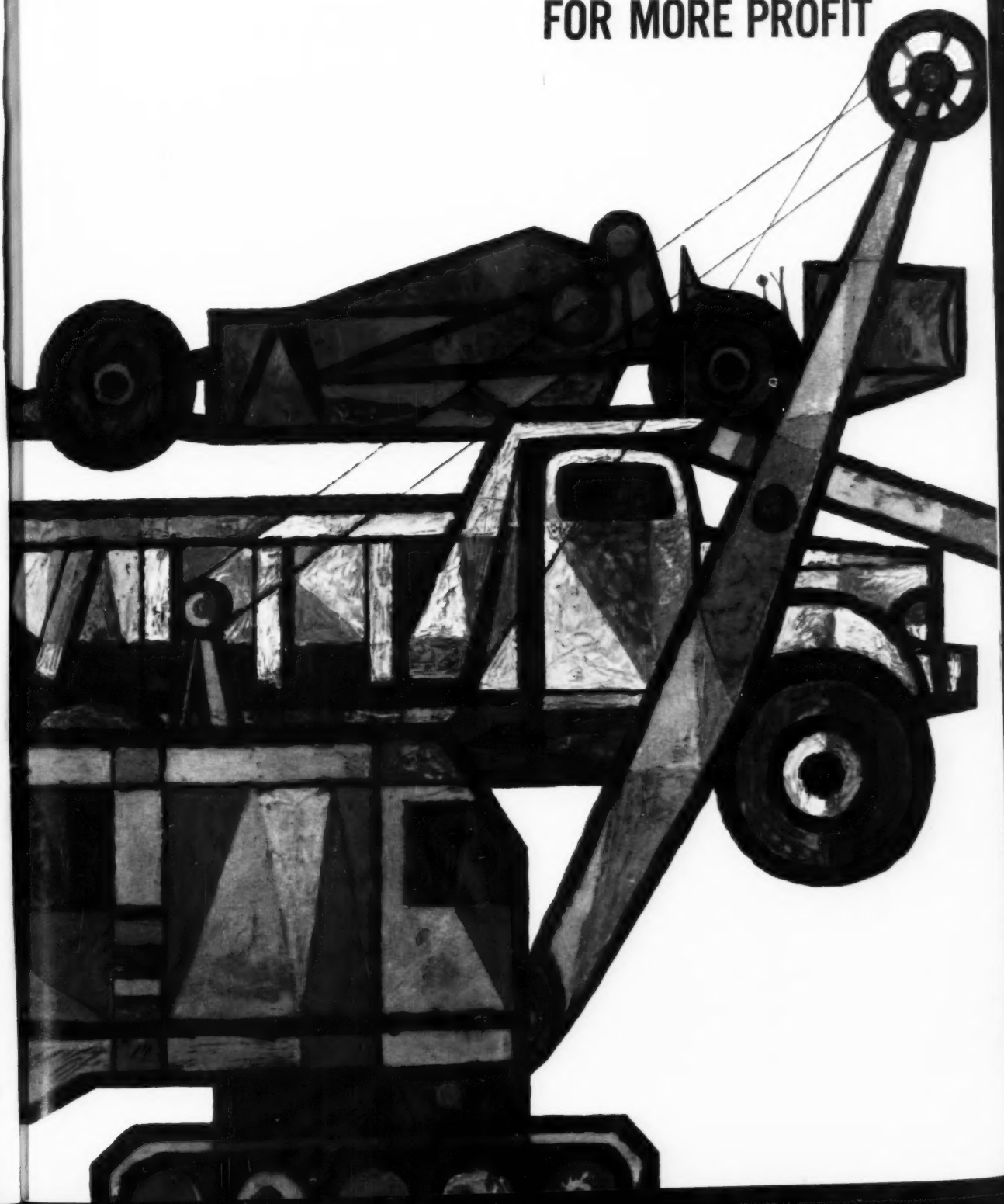

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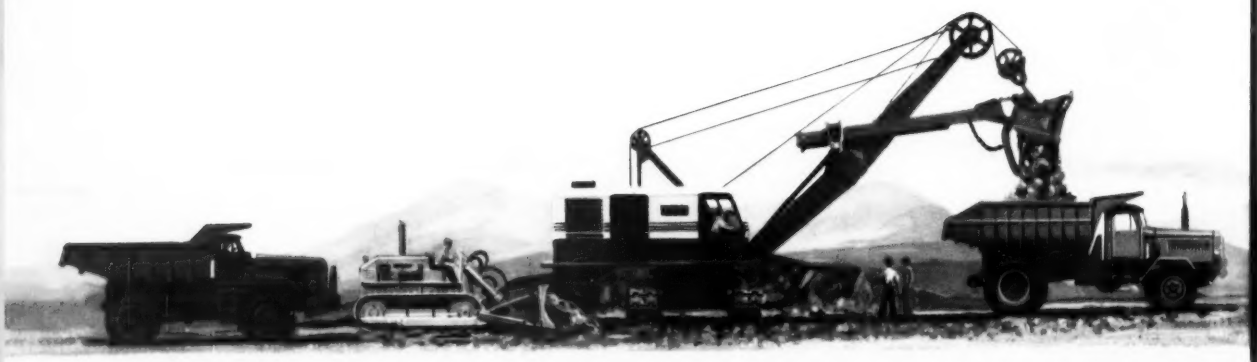

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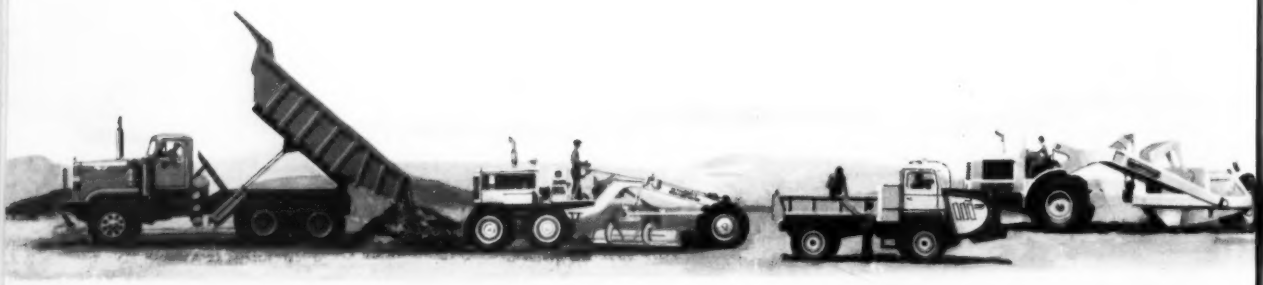

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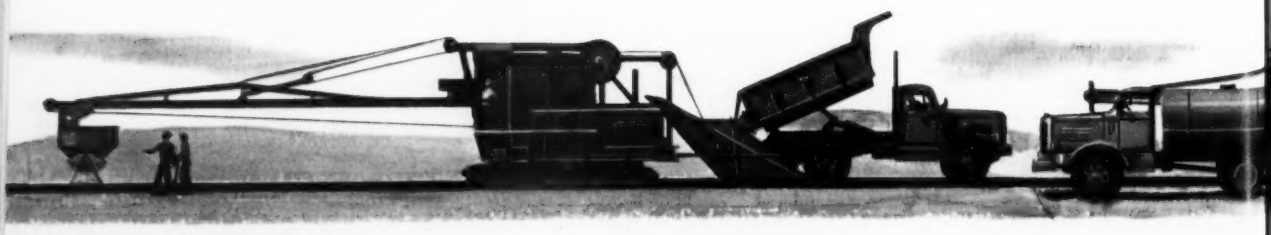

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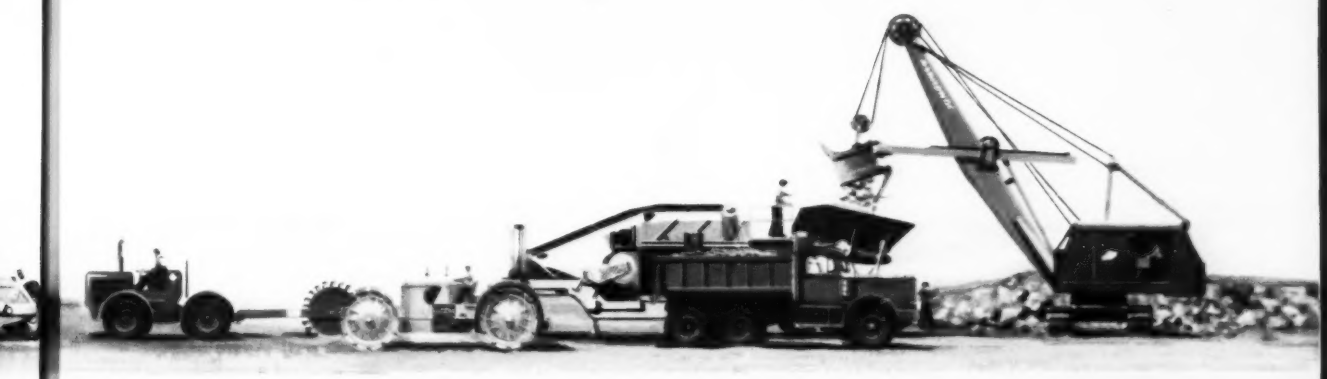

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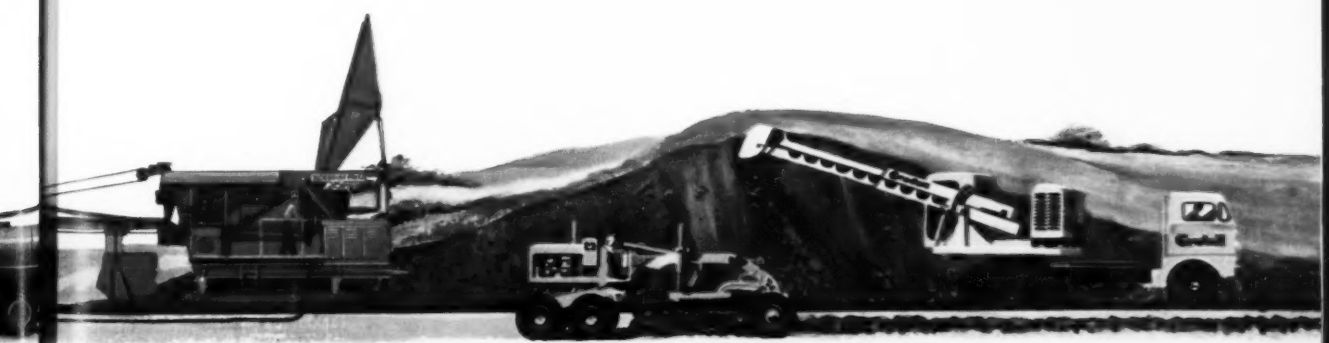

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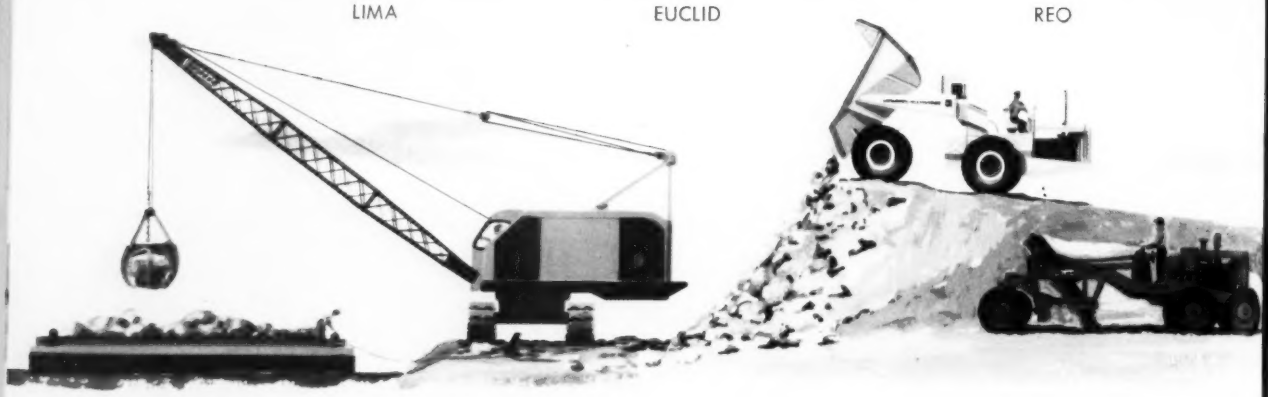

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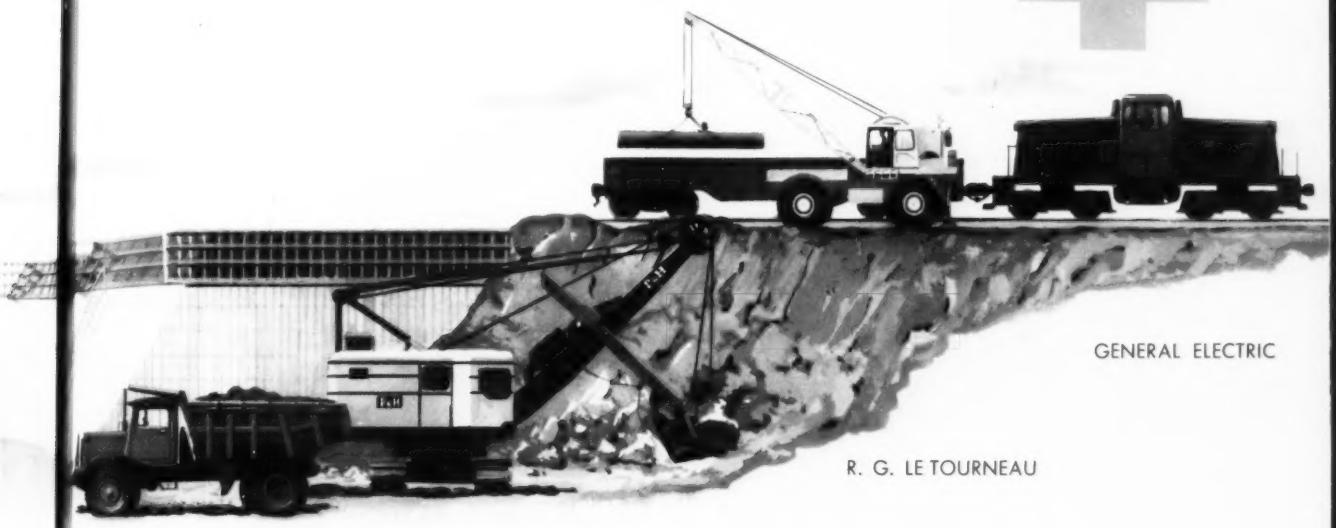

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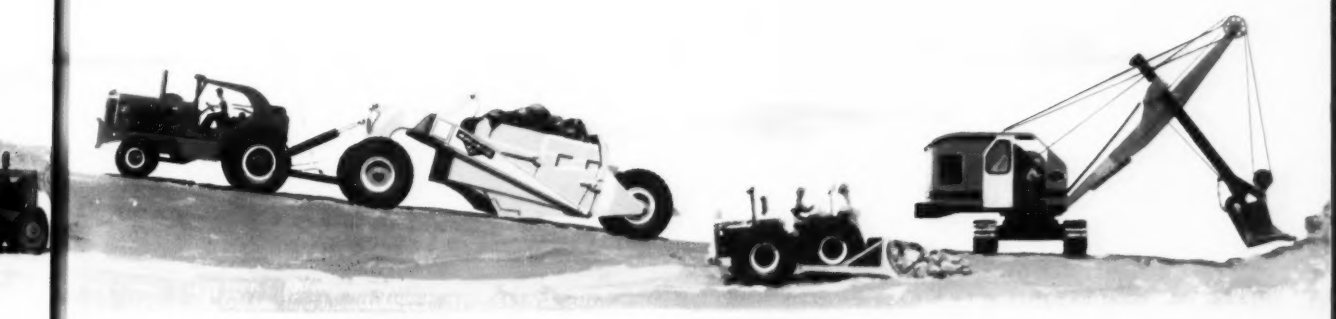

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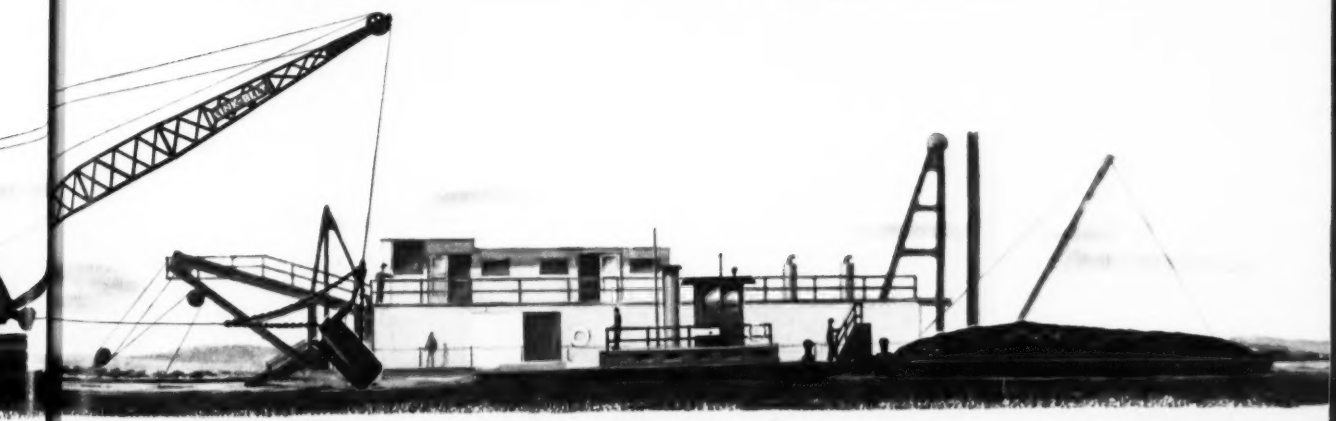

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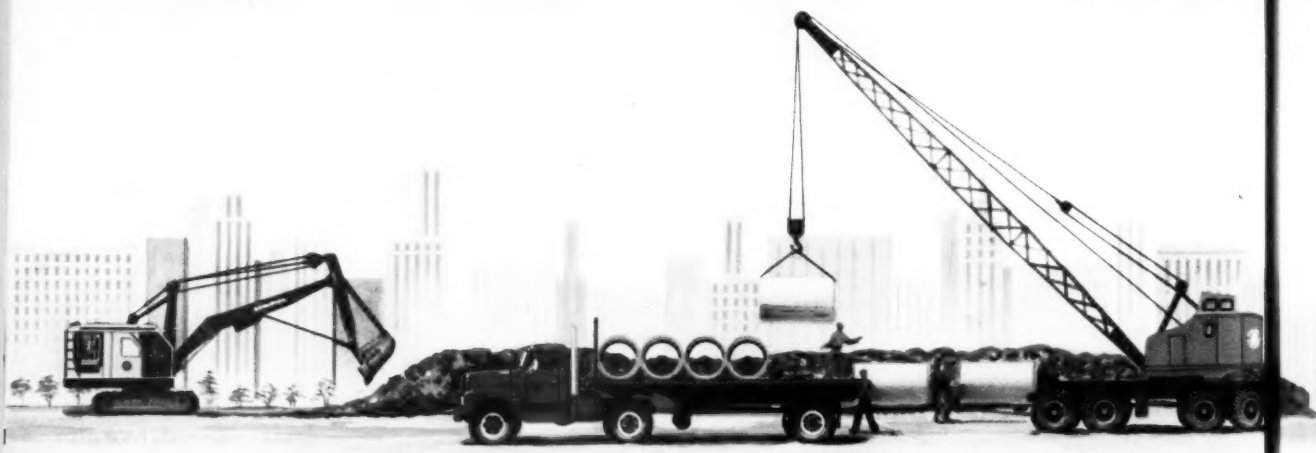

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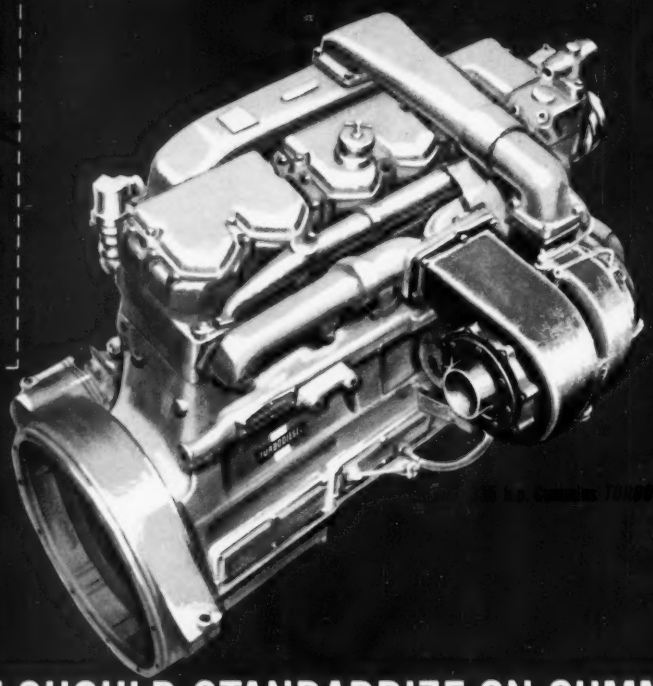

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An Alemite Portable Service Station pays for itself by saving your time, money and equipment. An outfit rigged especially for your needs can easily be selected from standard Alemite equipment. Here's how it works:

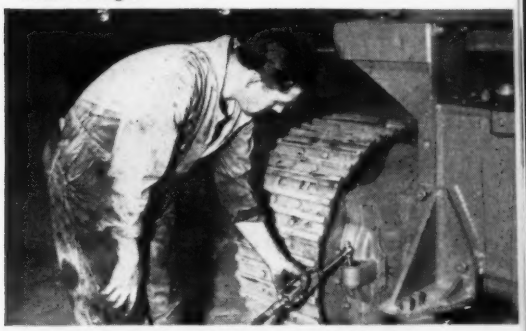
1. You choose the truck that fits your needs for size, power, terrain.

2. A standard air compressor is installed—usually behind the cab.

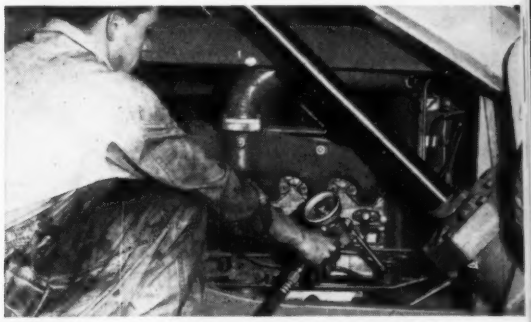
3. Alemite Barrel Pumps are added to handle pressure gun and gear lubricants, motor oils, that you will use.

4. A bank of Alemite hose reels are added. They reach out in a 40-ft. working radius to service your rigs right on the job.

Fast, easy, high-pressure lubrication of all bearings equipped with hydraulic or button-head fittings!



Quick filling of final drives, gear housings, transmissions!



No engine oil wasted — delivers exact amount of oil required!

Air line equipment for on-the-job tire inflating, air cleaning!

Right to the Job!

Alemite "On-the-go" Lubrication Has Helped Major Construction Companies Meet Tight Schedules on These Major Projects:

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See them Illustrated and Described in Detail . . .

Today Rogers is doubtless the best known and most respected name in the low bed trailer field. Units are being operated throughout the world by public utilities; state, county and city highway departments; heavy movers, riggers, contractors and military organizations.

Through long, specialized effort Rogers engineers have developed new designs that are now in common use and originated valuable Patented features that are available on Rogers trailers exclusively.

ROGERS BROS. CORP. Albion

See the Continual SHOW of ROGERS TRAILERS on Heavy HAULING OPERATIONS on the ROADS EVERYWHERE

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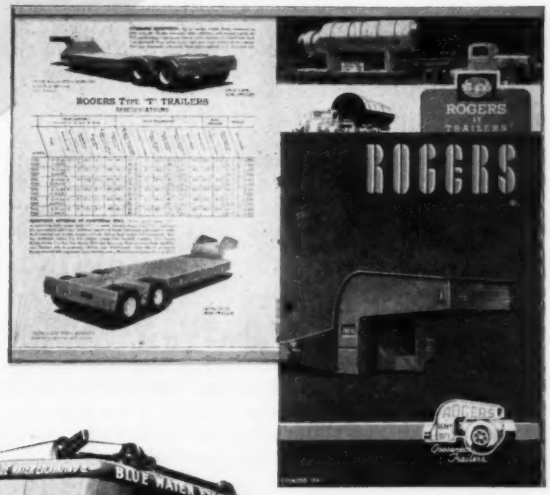

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JOY TWM-5 CHALLENGER DRILL

the BIG DRILL that has EVERYTHING

80° DRILLING RANGE

The Joy TWM-5 Challenger will drill at any angle between vertical and 10° above horizontal, making it applicable to almost any range of drilling required.

EXTREME MOBILITY

The TWM-5 is self-propelled on either rubber tires or crawler treads. It is driven on each side by a reversible piston type air motor, can turn in its own length, and can move into and out of most "tight" spots.

REMOTE CONTROL

All functions of operation, both drilling and moving, are controlled from the operator's station on the frame, directly over the left front wheel. Three hydraulic jacks provide stability while drilling.

TM-500 DRILL

The drilling machine on the TWM-5 is the JOY TM-500, a 5¼" piston drill, which has proved itself in quarry, construction, and mining work as the first and still the leader in the big drill field. The TM-500 is mounted on an extra sturdy mast which is raised and lowered hydraulically.

ADDITIONAL FEATURES

Optional features available on the TWM-5 are a cab, designed for the best in operator comfort and protection, and a dust collection system.

Check today on the Joy TWM-5 for your drilling operation. Whether you drill vertical holes or toe holes, it will fit your program and give added rock tonnages from the day it first goes to work. Write for complete information today to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Joy TWM-5 drilling deep holes (50' to 100') in granite in a southeastern quarry.

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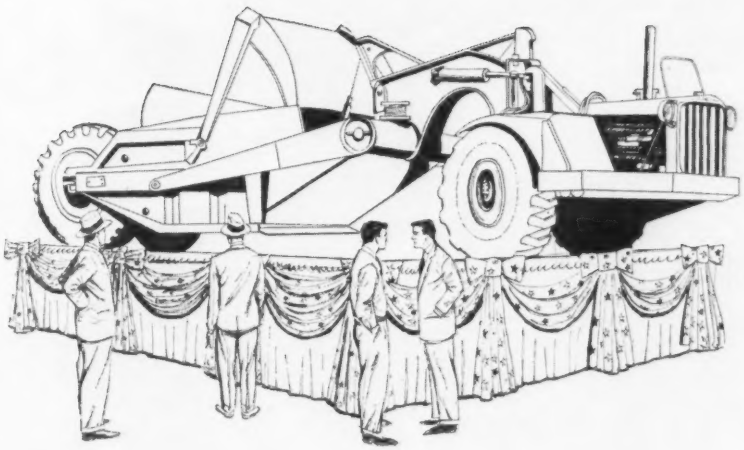
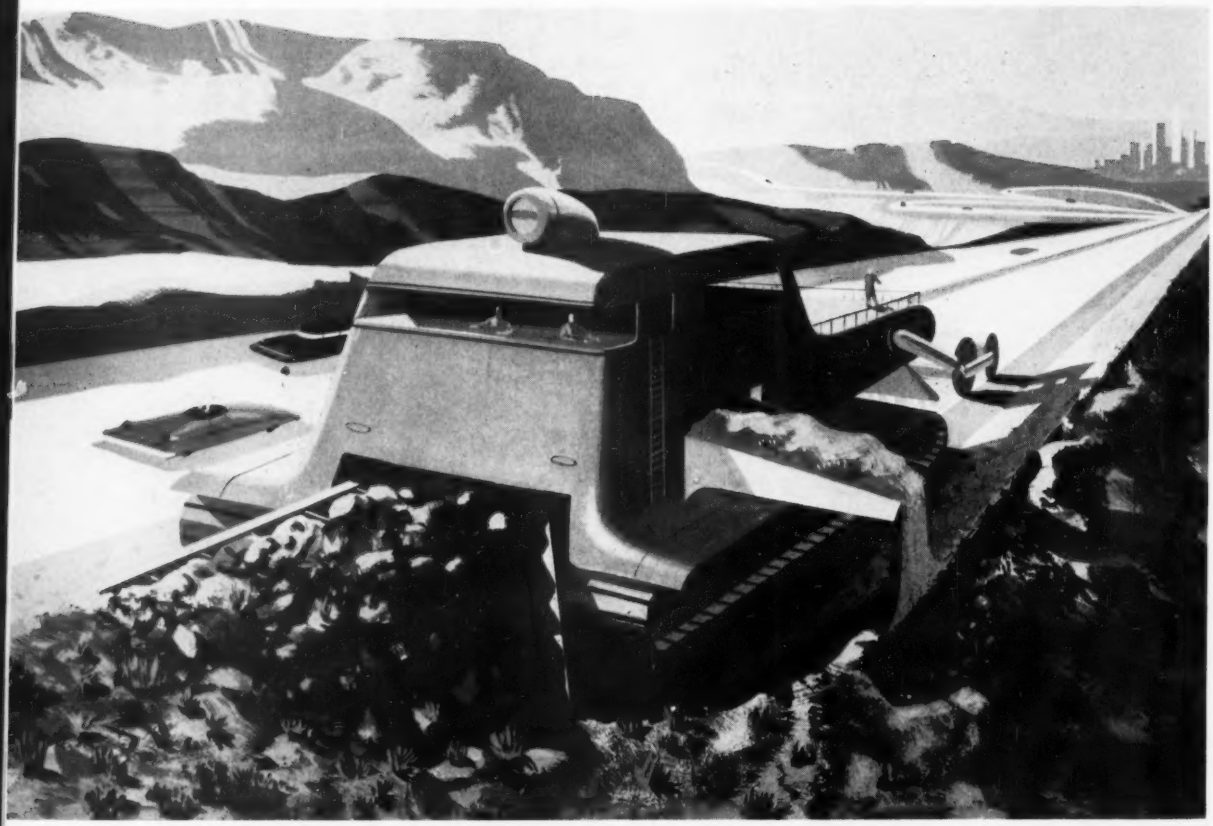
FOR OVER HALF A CENTURY



Construction Methods
reports on some equipment to be exhibited
in Chicago later this month

PREVIEW OF THE ROAD SHOW

- *New machines*
- *Attachments*
- *Accessories, parts*



This machine waits for the future, but visitors can expect surprises because . . .

New Rigs Highlight Road Show

THE LARGEST crowd of construction industry personnel ever assembled will flock to the nation's largest exposition hall Jan. 28 through Feb. 2 to view the largest industrial exhibit ever staged.

Visitors to Chicago's huge International Amphitheatre probably will not see the machine pictured above, but they will see an amazing collection of the best that 300 construction equipment and materials manufacturers have to offer.

"The Road Show will give contractors the opportunity of the decade to compare and select the tools they need for the upcoming highway program," according to Julian Steelman, president of the Koehring Co. and chairman of the Road Show committee. Some of the equipment that will be on display is described in the following pages, but it is by no means a complete listing. Many manufacturers are keeping details of their displays—and the rigs that they will unveil—under wraps until show time.

Cutaways, movies of the rigs in action, and working models of their component parts will feature many displays. Altogether, manufacturers are spending more than $8 million to show-case their latest developments.

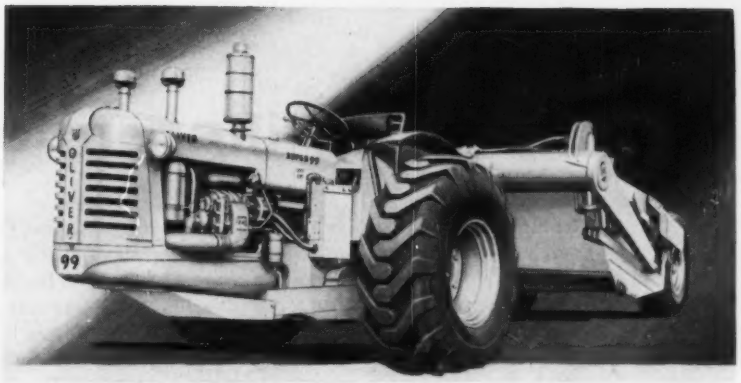
The show will be more than an exposition for the smart contractor; it will also be an education. The show's sponsor, The American Road Builders' Assn., has scheduled its convention to run concurrently with the equipment exposition.

The ARBA is billing its convention as the greatest seminar on roads and roadbuilding ever scheduled. It will be featured by a series of round-table meetings that will cover subjects relating to practically every phase of roadbuilding.

In addition to these open discussions, ARBA has lined up a series of guest speakers that include top-flight Federal, state, and municipal roadbuilding officials, as well as authorities from the contracting and engineering fields. Bertram E. Tallamy, newly appointed Federal Highway Administrator, and several members of the U. S. Congress also will be in attendance.

But the show's real star will be equipment—and enough of it will be on hand to blanket 12 football fields. The show's sponsors are calling it "The World's Fair of the Construction Industry," "A Pageant of Progress," and "Opportunity of a Decade." One thing is sure—there's never been anything quite like it.

Oliver Scraper



A SMALL self-propelled scraper, with a price tag designed to attract the contractor who handles a wide variety of smaller jobs, will feature Oliver's Road Show exhibit. A new small crawler tractor also will make its bow.

Besides wanting a multi-purpose unit for the small contractor, Oliver was looking for a self-propelled scraper that would make a versatile clean-up and fill-in rig on larger jobs. The result was a 6.7-yd unit designed for speed, low operating costs, and exceptional maneuverability. The scraper is powered by a three-cylinder 83.4-hp GM diesel, and it features fully hydraulic control of all scraper operations. The two-axle design in a rig of this size makes it a good worker in tight quarters.

The new crawler is the OC-4. Powered with a 21.8-dbhp gasoline engine, it features four lower track wheels to provide good track surface contact. A four-speed transmission delivers speeds of from 1.55 to 5.23 mph in forward and 1.8 mph in reverse.

A special loader model of the OC-4, with 46-in. inside center-to-center tracks, also will be on exhibit. It features a tough main frame and a rugged subframe that gives added strength and soaks up shocks and strains.

The OC-12, with power turning, will also be displayed. Two planetary reduction gear systems—one on each track—enable the operator to maneuver the rig by putting each track in a different speed range. Other Oliver rigs at the Road Show will include the 161-hp OC-18 crawler, and the largest and smallest of its line of wheel tractors. These will mount various attachments.

White Produces Off-Highway Truck

BIDDING for its share of the mushrooming off-highway truck market, the Autocar Div. of the White Motor Co. is now in production with the first of a proposed line of off-highway rear dumpers.

The model in production is the AP-15, a rear dump designed to haul rated payloads of 15 tons at up to 39 mph with a governed engine speed of 2,100 rpm. According to White, two larger models are already on the drawing boards. They are expected to be ready for production early this year.

Autocar considers its planetary gear drive rear axles, with ratios especially designed for off-highway operations, the principle feature of its rear dumpers. The AP-15 planetary rear axle, called the model PR-400, is available with final ratios of 12.69-to-1 and 14.09-to-1. The extent and the variety of these ratios, combined with a 10-speed transmission and a 200-hp Cummins diesel engine, make the AP-15 a fast and flexible off-highway hauler. A Cummins 250-hp turbocharged diesel also is available.

With its rated payload of 15 tons, the gross weight of the truck is 63,000 lb. Tires are 12.00x24 in front and 14.00x24 in the rear. Maximum wheelbase is 157 in. A 10-yd scoop-end rock body is standard.

Eimco Loader

THE NEWEST Eimco product at the Road Show will be a front end loader for the model 105 crawler. It is designed as a companion piece for the 105 overhead tractor-excavator.

The 44,000-lb unit, which is powered by a 132-hp engine, carries a 2½-yd bucket. It will operate effectively with only 9½ ft of headroom, and its best dumping height is 11½-ft. The loader has a high pivot point on the bucket so that in its fully extended position it can reach and discharge into a 14-ft high bin or hopper.

The loader's hydraulic system features built-in shock valves for both directions on both lift and dump cylinders, relief valves in all pistons at both ends of the stroke.

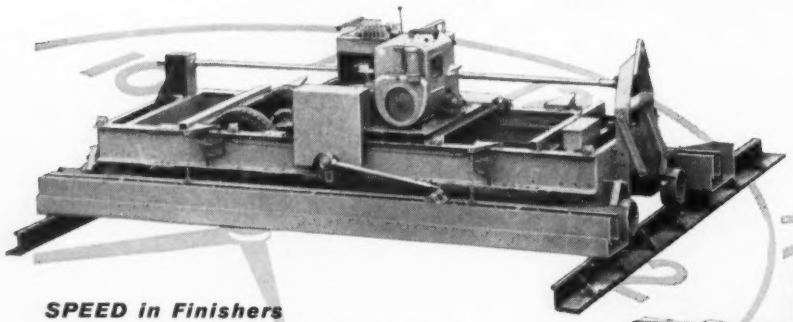
Continued on page 199

the *BIG* difference is *SPEED*...

The big difference that puts Rex Concrete Paving Equipment way ahead is speed...fastest over-all operation that puts extra profit in your pocket. *Speed* of operation...*speed* in getting to, on, and away from the job...these are the plus features that keep your jobs moving ahead of schedule.

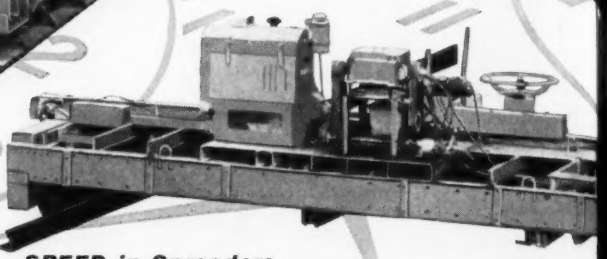
Only Rex gives you a complete line of portable and powered-frame widening paving equipment ...only Rex gives you the top-quality performance that puts you ahead to stay!

But don't take our word for it. Stop in at Booth 724 at the Road Show and see for yourself the extra Rex features that mean important time and money savings on your concrete paving projects. CHAIN Belt Company, 4664 W. Greenfield Ave., Milwaukee 1, Wis.



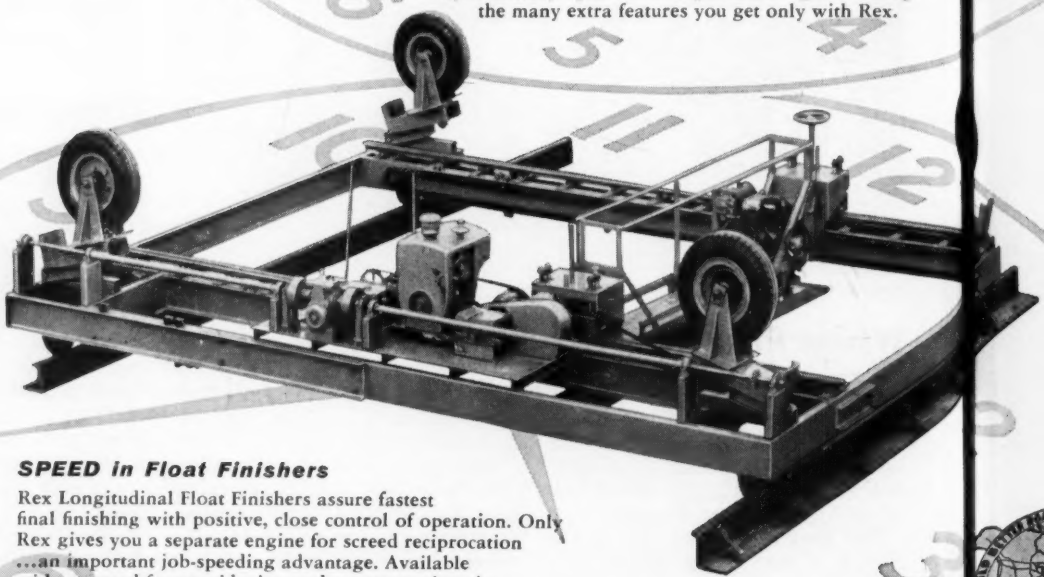
SPEED in Finishers

Rex Finishers give you the biggest screeds... 16 inches...plus 24 working combinations of screed and travel speeds that add up to far faster finishing. Powered-frame widening and hydraulic transportation rig, too!



SPEED in Spreaders

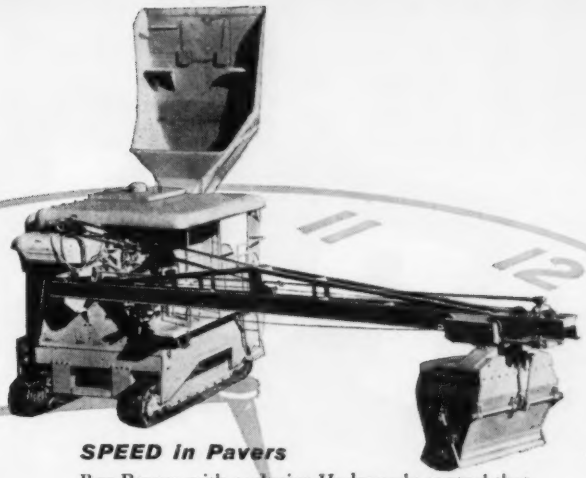
Rex Spreaders have extra speed that keeps them right on top of the paver. Powered-frame widening and hydraulically operated transportation rig are among the many extra features you get only with Rex.



SPEED in Float Finishers

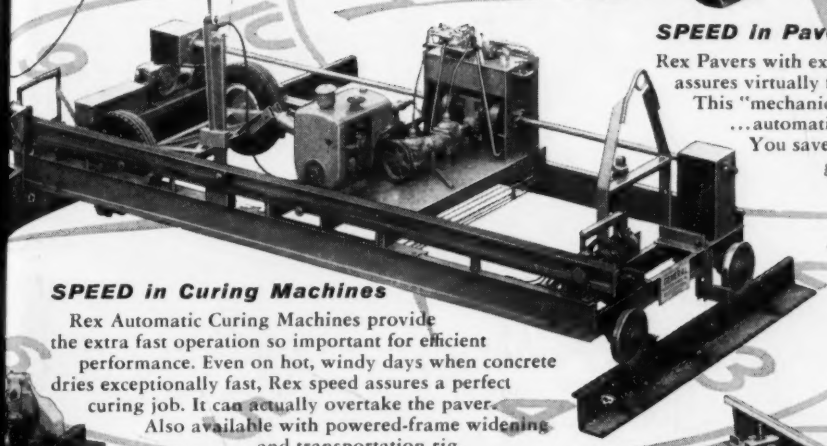
Rex Longitudinal Float Finishers assure fastest final finishing with positive, close control of operation. Only Rex gives you a separate engine for screed reciprocation ...an important job-speeding advantage. Available with powered-frame widening and transportation rig.

see for yourself
in booth 724
at the road show



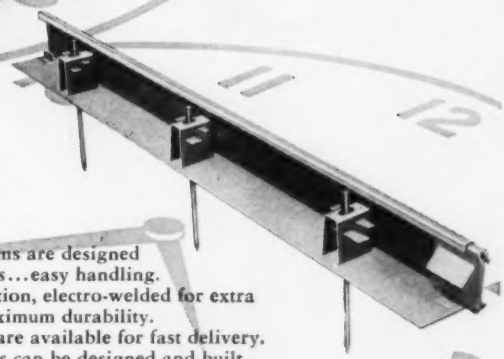
SPEED in Pavers

Rex Pavers with exclusive Hydrocycle control that assures virtually foolproof high-production operation. This "mechanical brain" eliminates the human element ...automatically controls the entire batch cycle. You save seconds on every batch... get more batches per day.



SPEED in Curing Machines

Rex Automatic Curing Machines provide the extra fast operation so important for efficient performance. Even on hot, windy days when concrete dries exceptionally fast, Rex speed assures a perfect curing job. It can actually overtake the paver. Also available with powered-frame widening and transportation rig.



SPEED in Forms

Rex Road and Airport Forms are designed and built for fast setups...easy handling. Special alloy-steel construction, electro-welded for extra strength, assures maximum durability. And Rex Forms are available for fast delivery. Special forms can be designed and built for your particular needs...fast!

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...Rex Adjusta-Wate Moto-Mixers®, the truck mixers that give you fastest over-all job cycles...Rex Building Mixers, Pumps, Railporter and Pumpcrete®...curb, gutter and sidewalk forms...top-quality construction equipment designed to assure profitable operation, job-speeding performance for you.

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See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957

CONSTRUCTION REX MACHINERY

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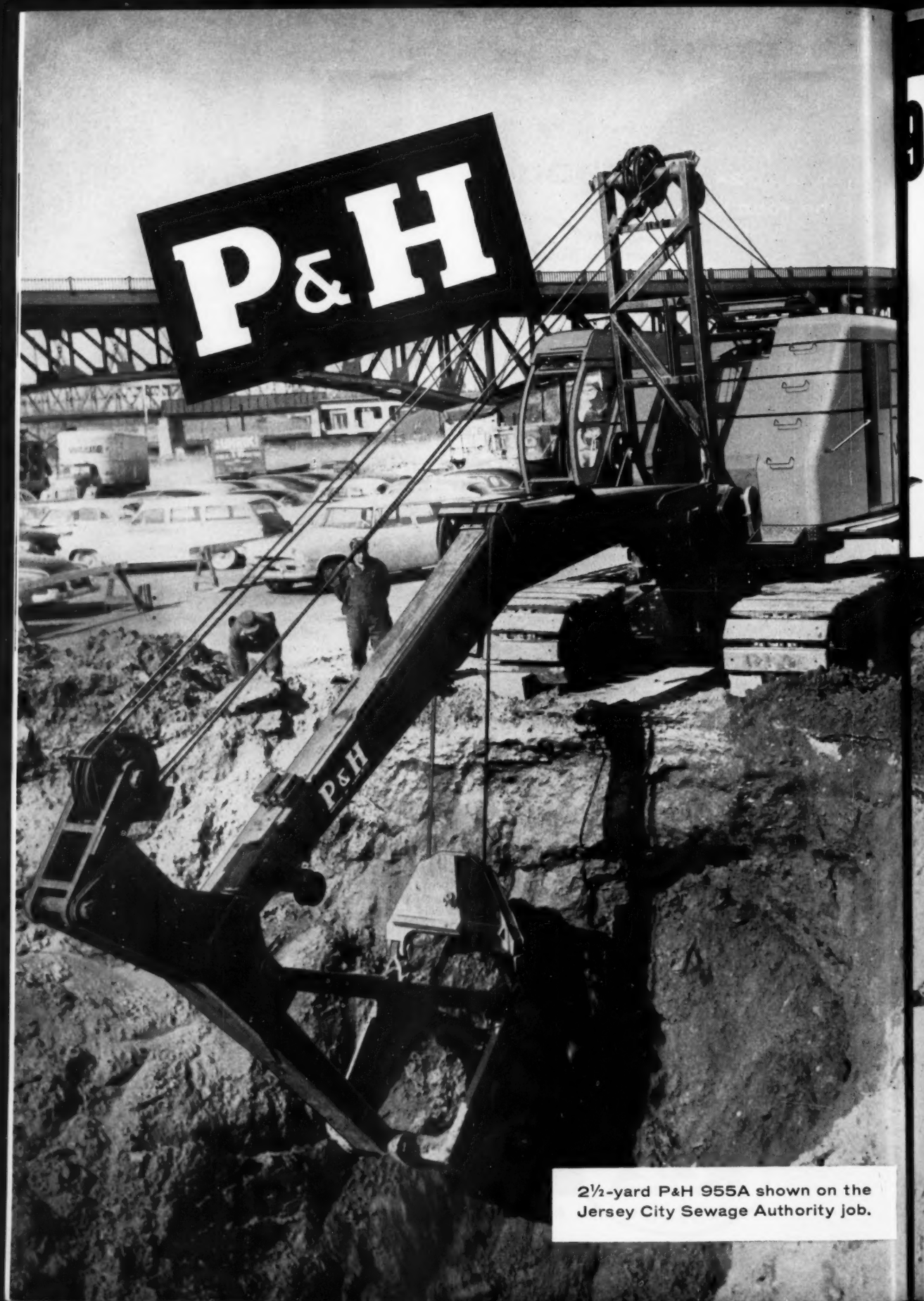


2½-yard P&H 955A shown on the Jersey City Sewage Authority job.

9¢ a cu.yd....283½ yds.an hour*

with 2½ yd. P&H "Job-Designed" Trench Hoe

Each year more and more contractors are upgrading their equipment to the greater speed, power, accuracy and profitability of P&H "job-designed" power cranes and shovels.

The P&H 955A, pictured at the left on the Jersey City Sewage Authority job, digs 283½ cu. yds. an hour at a cost of 9¢ per cu. yd. (depreciation excluded) for the LaFera Contracting Company, Newark, N.J.

There's good reason for this typically profitable P&H performance. With the 955A it begins with Magnetorque†—the simplest and most advanced power drive known. Magnetorque transmits power for swings electro-magnetically—without friction, without wear. Swings are smoother, more easily controlled—and from 15% to 25% faster.

In addition to Magnetorque, you get P&H greater stability for more power at the tooth point—rapid reversing chain crowd for snappier dipper action—direct hydraulic control for smoother, easier control. This combination of outstanding P&H features gives the 955A the power, speed and flexibility to get the best performance out of your best operators.

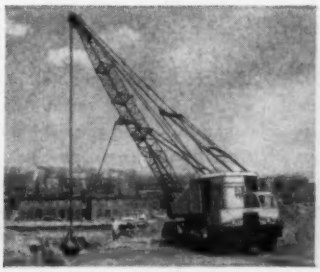
Call your P&H dealer soon. No matter what the capacity needs or nature of your job, he can show you a P&H model that will help you dig more and lift more at a lower cost. Harnischfeger Corporation, Construction & Mining Division, Milwaukee 46, Wisconsin.

†T.M. Harnischfeger Corp. for electro-magnetic type coupling.

THE P&H LINE Truck Cranes: 8, 10, 15, 20, 25, 30, 35 and 40 tons
Shovels: ½, ¾, 1½, 1¾, 2½ and 3½ yards

Across the country P&H machines lead the field in power, speed, flexibility and profitable performance

INDIANA
For larger loads there is the big 3½-yard P&H 1055. At Standard Material Corporation's White River plant it is used to hold down costs in handling aggregates.



RHODE ISLAND
Gammino's of Providence depend on 35-ton P&H 555A-TC truck cranes for fast, economical performance in excavating on the big North-South Freeway job.

TEXAS
In the 1½-yard class, T. F. Jones Construction Co. profits from greater strength of the P&H 655B shown above on a Texas Highway Project in Hockley County.

*WRITE TODAY FOR VERIFIED P&H COST-PERFORMANCE FACTS

BUILD BETTER ROADS TODAY
FOR A GREATER AMERICA
See you at the ROAD SHOW CHICAGO
Jan. 28-Feb. 2, 1957
AMERICAN ROAD BUILDERS ASSOCIATION

Harnischfeger Corporation, Dept. 500
Construction & Mining Division
Milwaukee 46, Wisconsin

Gentlemen:
Please send me field report No. 5505 on the 2½-yard P&H 955A.

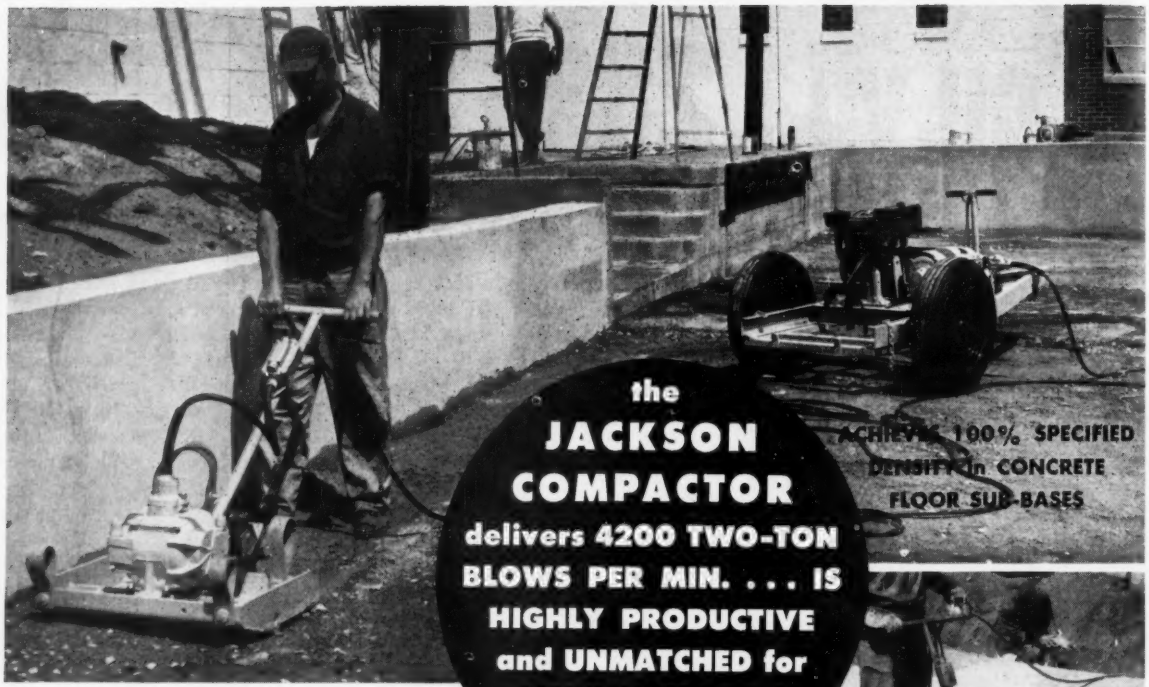
*Name*_____

*Title*_____

*Firm*_____

*Street*_____

City _____ *Zone* _____ *State*_____



the JACKSON COMPACTOR delivers 4200 TWO-TON BLOWS PER MIN. . . . IS HIGHLY PRODUCTIVE and UNMATCHED for VERSATILITY and CONVENIENCE!

ACHIEVES 100% SPECIFIED DENSITY in CONCRETE FLOOR SUB-BASES

The JACKSON VIBRATORY COMPACTOR, together with a JACKSON auto-trailer-generator unit equipped to quickly pick up and lower the Compactor, is the handiest, most efficient and versatile outfit imaginable for compacting both granular soils and blacktop in an almost unlimited variety of applications. In granular soils 100% specified density is readily achieved in 10" layers at the rate of 1800 sq. ft. per hour. 5" layers of bituminous mixes are also compacted close to maximum density at the same rate of production. And when a twin hookup is used, such as shown below, one man can easily double this production since the machines are self-propelling and need only be guided by the operator. (THE JACKSON IS THE ONLY COMPACTOR WHICH CAN BE USED IN TWIN HOOKUP.) Quickly interchangeable bases of 12" to 26" widths is another feature that adds to the great versatility of the JACKSON COMPACTOR. For consolidating sub-bases of concrete floors, bridge approaches, compacting in trenches, close to abutments, pavement widening sub-bases, patching and widening bituminous pavement and paving blacktop walks and drives this is the greatest money-making outfit you will discover anywhere. See it at your Jackson Distributor. His name and literature gladly sent on request. Write, NOW!

BACKFILL ▲▼ TRENCHES

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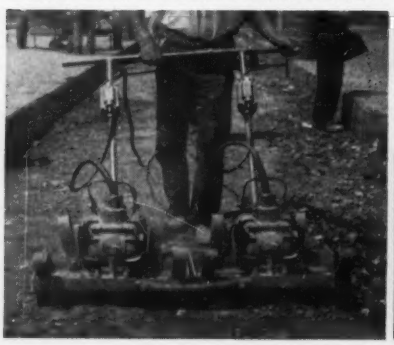
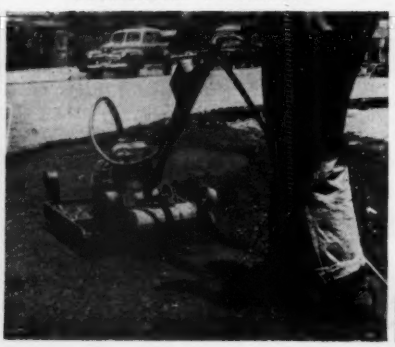


PAVEMENT PATCHING



PAVING DRIVES and WALKS

Euclid Features Big Scrapers

TWO NEW 24-YD SCRAPERS, a new 40-ton twin-engined rear dump, and an improved version of the TC-12 crawler will highlight Euclid's exhibit at the Chicago Road Show. In addition, Euclid will introduce two other new rear dumps, a 13-yd bottom dump, and an improved C-6 crawler.

One of the new 24-yd scrapers incorporates Euclid's Twin-Power feature—the use of two engines driving separate axles through separate transmissions. Called the TS-24, the new overhung-type scraper is powered by a 300-hp diesel in the tractor and a 218-hp engine located behind the scraper. Allison Torqmatic drives, and Euclid's NoSpin differential and planetary axles are employed in both power trains.

As on other Euclid scrapers, hydraulic lever action controls all bowl, apron, and ejector operations. There is only 16 ft of cable on the entire 80,000-lb capacity unit. Standard tires are 27.00x33, and 33.50x33 tires are available as optional equipment.

The other new 24-yd scraper is the single-engined, six-wheel SS-24. This scraper, which carries up to 31 yd heaped, is powered by either a 300-hp GM or 335-hp turbocharged Cummins engine. Both engines take a four-speed Torqmatic drive. The new unit has a box beam frame, trunion front axle, and the largest Euclid planetary drive axle ever used on a scraper. Standard tires are 27.00x33, with 33.5x33 tires available.

The SS-18, which replaces Euclid's 15.5-yd scraper, is a six-wheel unit. It is rated at 60,000-lb payload capacity, and it carries up to 25-yd heaped. Power is supplied by either a GM or Cummins 300-hp diesel engine with a three-speed Torqmatic drive transmission. Standard tires are 24.00x25 on drive and scraper wheels.

Horsepower in the Twin-Power TC-12 crawler has been increased to a total of 436-hp. Other major improvements include longer tracks with eight rollers each (more than any other tractor); larger diameter sprocket, idler gear pins, and bushings; and 27-in.-wide standard tracks. Top speed is now 8.3 mph, and operating weight (bare) is 62,500 lb.

Each of the TC-12's 218-hp engines drives one track through a separate Torqmatic drive consisting of a torque converter and semi-automatic transmission.

The smaller C-6 crawler, which has been available on a limited basis, is powered by a single 218-hp engine that delivers 208 hp to the power train. Bare operating weight is 38,620 lb, and top speed is more than 8 mph.

Euclid's new 40-ton rear dump (26-yd struck capacity) is a Twin-Power unit with separate engines powering the drive axles through three-speed Torqmatic drives. The new unit, called the R-40, replaces Euclid's former 34-ton rear dump. It is powered by either two 235-hp GM engines or two 250-hp Cummins engines.

Altogether, Euclid will exhibit 16 earthmovers at the Road Show, including late production models of the S-7 and S-12 scraper, an improved S-18 scraper with a supercharged engine, a 13-yd bottom dump, and the model TDT 17-yd bottom dump.

TWO-CYCLE DIESELS suitable for practically every type of road building equipment now in use will be displayed by the Detroit Diesel Engine Div. of General Motors at the Road Show.

Having their first public showing will be the 171-hp and 236-hp models of the series 71 type, and a newly-designed 300-hp 6-110 Roots blower engine. In all, Detroit Diesel will display eight models from 90 to 300 hp.

The new series 71 Turbopower engines are four and six-cylinder units that utilize exhaust-driven tubines and air impellers to supplement the air supply to the cylinder—a contribution that increases engine efficiency by 17%.

HD21 Highlights A-C's Exhibit

"ENGINEERING IN ACTION" is the theme of Allis-Chalmers' large Road Show exhibit, which will include representative models of its complete line of equipment—crawlers, scrapers, tractor-shovels, rear dump, and motor graders. In addition, the Buda Div. will display several power plants and generator sets, and a new 6,000-lb capacity fork lift truck especially designed to handle construction materials.

The Allis-Chalmers Industry Group will exhibit a gyratory crusher and the revolutionary ACL cement processing plant that it introduced early last year.

The 204-hp HD21 torque converter-equipped crawler, the biggest in Allis-Chalmers' line, will be featured by the Tractor Group. One HD21 will mount a cable-controlled dozer, and the other will carry a 4-yd tractor shovel, the biggest crawler-shovel of its type on the market. The other crawlers will be the HD 6, 11, and 16.

Other Tractor Group units on display will be the 20-yd TS-360 scraper, the 14-yd TS-260 scraper, the Forty Five motor grader, the 15-yd TR-260 rear dump, and the Model D motor grader. The model D grader, mounting a rear-end loader, will be part of an exhibition demonstrating road shoulder construction and maintenance.

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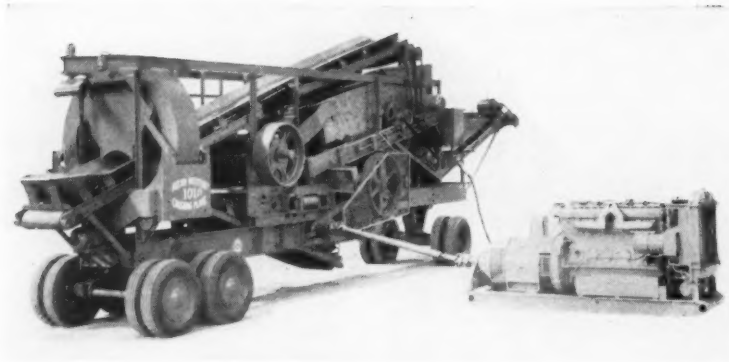


Iowa Crusher Includes Grizzly

A CEDARAPIDS portable primary crushing unit with a vibrating grizzly that acts as a by-pass for materials under crushing size will be introduced by Iowa Mfg. Co. at the Road Show. The new design reduces the load on the crusher, prevents jamming, and reduces maintenance requirements, according to the company.

In operation, dirt and fines passing through the grizzly bars drop into the by-pass chute and then they discharge into an under-crusher conveyor that carries it to the next crushing unit.

To meet demands for a screen that will produce bigger quantities of accurately graded aggregate, Iowa will also introduce a new 60-in.x16-ft, triple-deck horizontal-vibrating screen—the largest in the Cedarapid line.

Iowa is also introducing a new stabilized base mixer that utilizes the same design as Cedarapid's popular bituminous pugmill mixer.

Shield Bantam

AT THE '48 ROAD SHOW, the Shield Bantam Co. displayed its complete line: a single, truck-mounted crane. Since that time, the company has built and sold more than 6,000 units in the small and medium-sized class and today it offers not only upper machinery but a selection of crane carriers as well.

At this year's show, Bantam will display a new 7-ton truck-mounted crane, the crawler-mounted C-35, and the self-propelled model CR-35 crane. A line of attachments and Bantam's latest crane carrier, the 6x6 model 300, will also be on display.

Bucyrus-Erie Shows 1-Yd Excavator

A COMPLETELY NEW crane-excavator in the 1-yd class—the model 30-B—offers five optional track sizes, easy front-end convertibility, and air-controlled operation. It will share the spotlight at Bucyrus-Erie's Road Show booth with several other new machines introduced within the past year. A 35-ton transit-crane model of the 30-B will also be on display.

All main operating functions of the new excavator are air-controlled through levers that give the operator a good sense of feel over the load. Air controls handle the hoist clutch, crowd and retract clutches, swing clutch, steering jaw clutches, digging brakes, swing brake, and dipper trip.

The 30-B is available with a diesel engine with direct or torque converter drive, a gasoline engine with direct drive, or an electric motor.

As a crane, the 30-B crawler handles booms up to 100-ft long, plus 10, 20, or 30-ft jibs. The truck crane handles booms up to 130 ft long. Booms furnished with the crane are of open throat construction. Boom hoist is independent.

Other features include a newly designed dipper with Becoloy single or two-part teeth and large diameter boom point sheaves.

Ingersoll-Rand

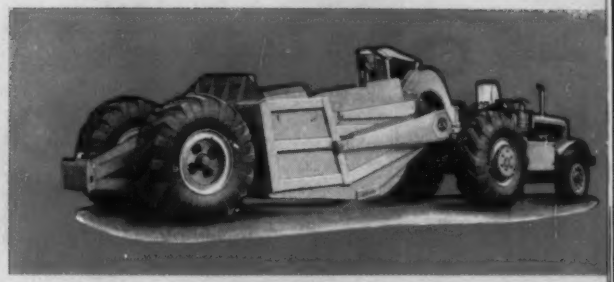
FEATURING a hydraulically operated boom and powered dump and swing, Ingersoll-Rand's new Crawl-Ir drill will be displayed for the first time at the Road Show.

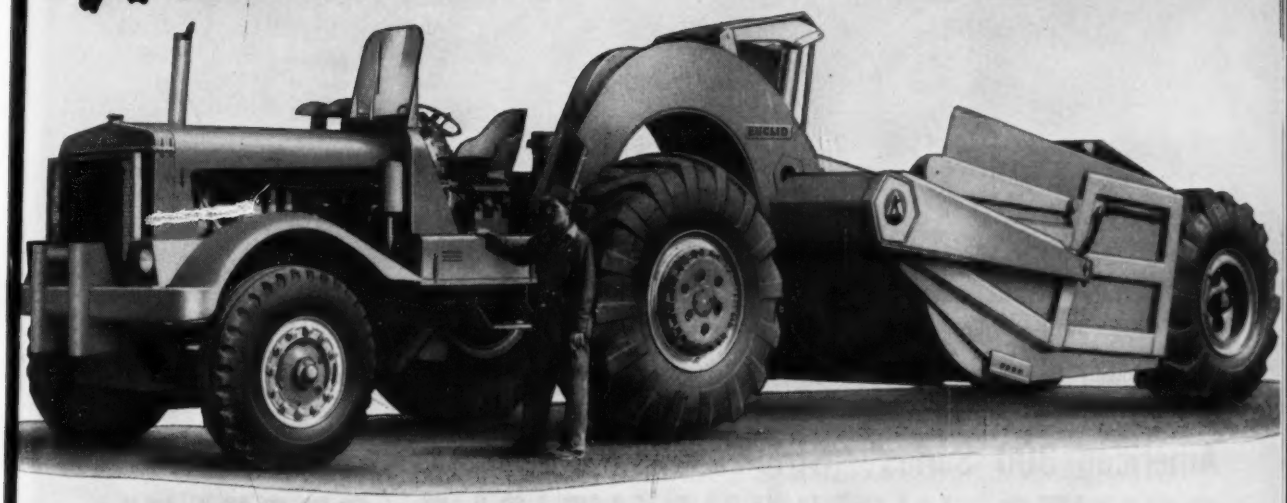
Other Ingersoll-Rand exhibits will include representative models of its Gyro-Flo line of rotary compressors, Carset Jackbits, Jackbit Grinders, powered hand tools, and accessories. The popular self-powered Drillmaster rig, which can drill up to 6½-in. dia holes, will also be shown.

Continued on page 205

Here's the NEW SS-24 "EUC" SCRAPER

31 Yards HEAPED!





Increased Production for high speed, long haul jobs

Euclid's new Model SS-24 has a struck capacity of 24 cu. yds. . . . carries up to 31 yards heaped at 1:1 slope . . . is available with either a 300 h.p. or 335 h.p. engine.

New Allison Torqmatic Drive with four speed ranges provides plenty of torque in lower ranges to meet the requirements of heavy loading and soft fills, yet permits high travel speeds for fast hauls. Shifting under full power without loss of momentum reduces cycle time.

Six wheel design of this SS-24 gives it exceptional stability for long fast hauls. It is equipped with No-Spin differential, Euclid planetary drive axle and 27.00 x 33 drive and scraper tires (33.5 x 33 are optional). Euclid hydraulic lever control of all scraper operations eliminates down-time and expense resulting from cable breakage. The cutting blade's four sections are interchangeable and reversible, providing straight and drop-center arrangements and longer blade life in any material.

See your Euclid dealer for more information on this big new scraper and the complete line of Euclid earthmovers . . . he can show you why ***Euclids are your best investment.***

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

FIVE AXLES distribute the weight of this stripped-down American 300 Series Truck Crane owned by Moore Dry Dock Company. By carrying the counterweight and extra boom sections on a trailer, the Oakland, California firm can move without permits over *any* highway because the machine meets legal axle load limits.

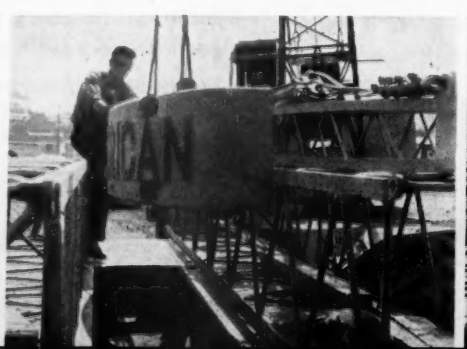
American 300 Series' "Strip-Ease"

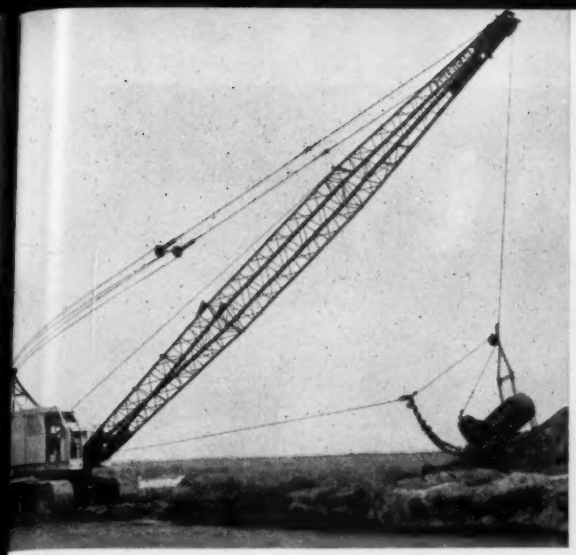
SOLVES HIGHWAY WEIGHT PROBLEM

How much work or red tape is involved in moving your crane from one job to another? Unless you can move your equipment speedily from place to place, it's cutting into your profits and can be slowing down your whole operation. American engineers knew how weight restrictions could affect crane mobility when they designed the 300 Series machine. As a result, they designed this machine to "strip" quickly, using engine power to do the work—even spot the counterweight on truck or trailer. Americans, ready to move faster and ready to work sooner, earn bigger profits!

Why do American cranes spend less time between jobs? They do much of their own set up and disassembly work—use engine power to erect the gantry—handle the counterweight and lift as much as 100 feet of boom and 30 feet of jib right from the ground! There are many reasons why American Cranes spend *less time* between jobs—do *more work* on the job. Your Distributor will tell you all about the American line that starts with a ½-yard, 12½-ton machine!

THREE STEPS, using the crane's power, strips the 300 Series. (1) lowers the counterweight; (2) picks up counterweight and swings it over trailer; (3) lowers it into place on specially built trailer. Final operation is to lower the boom onto trailer, then drive off.



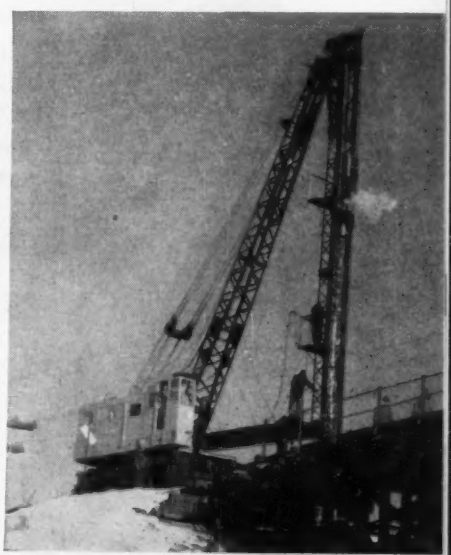


"CAPACITY PRODUCTION job after job", sums up owner reports on the big American 700 Series Crane. Precise design eliminates unnecessary, power robbing weight without sacrificing strength. As a result, you get higher work capacity in relation to weight. The 700 Series Dragline shown above is handling a 2¼-yd. bucket. It gives its owner high production, economy and limited downtime—gives its operator air controls and fast, simple preventive maintenance! This American is available on a crawler or truck mount with a variety of fronts.

SEWER EXCAVATION IN SOFT SAND is speeded up with the American 300 Series' dipper pitch bar design. With this exclusive feature the bucket tilts back as it comes up out of the hole—tucks under the boom to reduce spillage. Fuller buckets and more swings per hour make Americans the top producing cranes in the industry! Get all the facts about the right front—shovel, backhoe, dragline or crane—and the right mount—rubber or crawler—for your job from your nearby distributor!

NEW ADDITION to the American Line is the highly maneuverable, extremely versatile 200 Series Truck Crane. Many big crane features—proved on the 300 and 700 Series—have been built into this ¾-yard, 22½-ton machine. As a result, production ability goes up while operating and maintenance costs drop to an amazingly low figure. You'll see why you get big crane performance at smaller crane cost when you examine the new 200 Series with any front end attachment on crawler or rubber mount.

PILE DRIVING is just one construction and maintenance of way job performed by American Locomotive Cranes for the nation's railways. Volume materials handling jobs around the plants and yards of the world's big industries—automotive, metal production and fabrication, paper and forest products, public utilities, petroleum and many others—are everyday assignments for big American Locomotive Cranes! American designs and manufactures cranes, hoists and derricks to do the world's work faster, better and at lower cost!



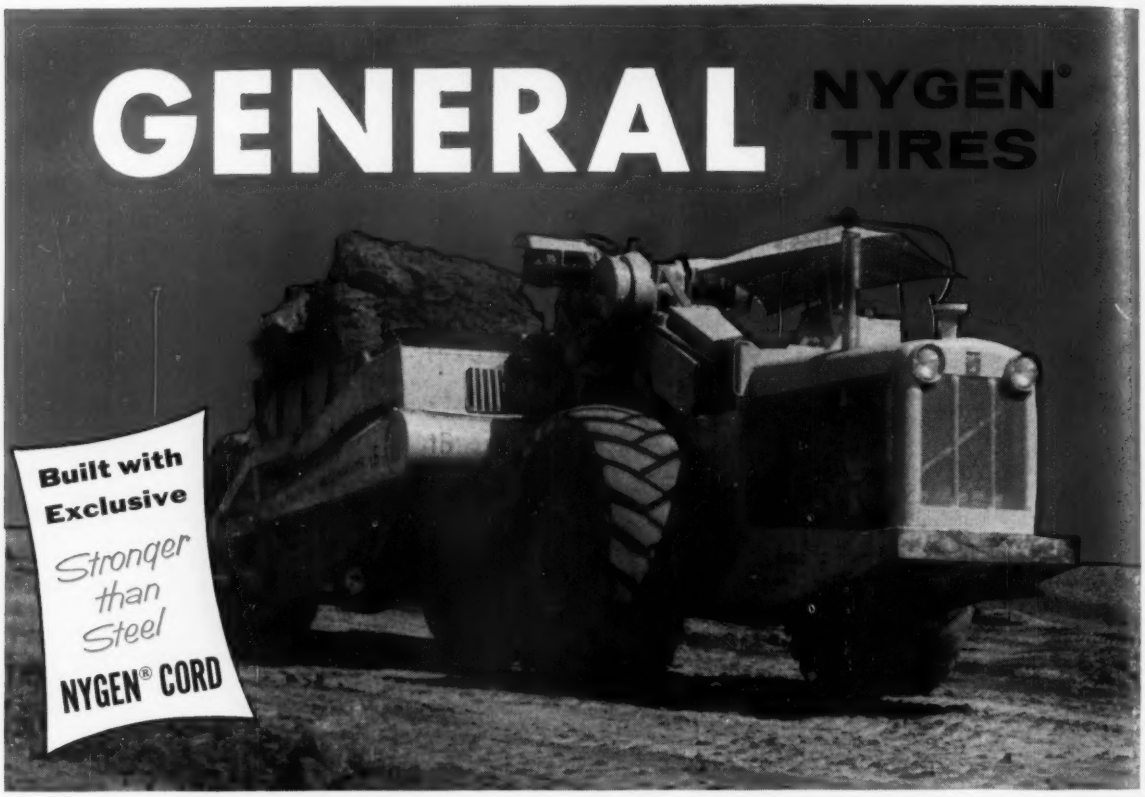
NO MATTER WHERE YOU WORK your American equipment, you're never far from factory-trained servicemen. American Distributors are located to serve the principal trading areas of the United States and Canada. Topflight mechanics from American Distributors attend periodic factory schools to learn efficient repair and service techniques that cut your costs. Distributors maintain complete service facilities and replacement parts inventories. For the name and location of your nearest American Distributor, write:

AMERICAN HOIST

and Derrick Company

Saint Paul 1, Minnesota

GENERAL NYGEN® TIRES



...Designed to stand up where others let down!

Unsurpassed for ruggedness, strength and dependability, General Truck Tires deliver the maximum in profitable performance. From the big, new All-Duty LCM with extra wide treads for tractor-like drive and flotation, to the rough, tough HCT Logger, the General Truck Tire performs better because *it's built better!* You'll get the job done faster and for more profit when you switch your equipment over to Generals.

specify GENERALS on your new equipment

THE GENERAL TRUCK TIRE

THE GENERAL TIRE & RUBBER CO., Akron, Ohio

International Displays Line

SINCE THE LAST Road Show, the Construction Equipment Div. of International Harvester has taken over the Bucyrus-Erie towed-scraper line, developed a line of self-propelled scrapers from the old Heiliners, added the Frank G. Hough Co. and its front-end loaders, cooperated and Drott on a line of skid shovels, and gone into the off-highway truck field.

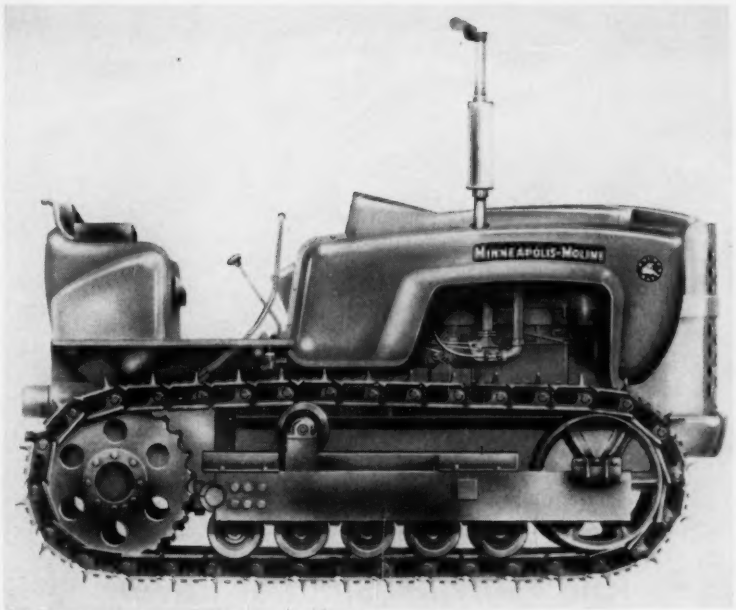
Examples of these developments, as well as production models of its crawler tractor line (41.5 to 200-hp) and its line of power units, will be on display at International's booth. Also on hand will be the recently introduced crawler-type model 12 Payloader, a front-end loader with a 1¾-yd capacity. In addition, the Truck Div. will show eight truck models especially adapted for highway work. As for "tomorrow," company spokesmen indicate that several pieces of equipment now in the experimental stage will be unveiled.

Of special interest will be International's two new off-highway haulers—the 18-ton model 65 Payhauler and the 24-ton model 95. The big 95 Payhauler is powered by a turbocharged diesel that develops 335 hp at 2,100 rpm. It offers exceptionally high top speeds of 37.2 mph with a gear drive transmission and 35.2 mph with a torque converter. The model 65, available with either a 5 or 10-speed transmission, can roll along at 36½ mph.

Pioneer

BESIDES unveiling its new series of portable duplex type gravel plants (CM&E, Dec.), Pioneer Engineering will also show its newest and biggest portable hot-mix plant and its popular Vibromatic bituminous paver.

The new portable hot mix plant is the Big 102, a continuous flow model available with diesel, diesel-electric, or all-electric power. Because it breaks down into two main units, the rig is exceptionally portable. The combination drier and dust collector mounts on one rubber tired chassis, while the gradation-mixer unit mounts on another. The plant is capable of producing up to 150 yph.



M-M Enters the Crawler Field

MINNEAPOLIS-MOLINE joins the ranks of manufacturers of medium-sized industrial tractors this month when it introduces a 57-hp crawler tractor and two rubber-tired tractors. According to a company announcement, these units are the forerunners of a complete line of small and medium-sized tractors and attachments.

A main feature of the tractors is a newly-designed 206-cu-in. high-turbulence, valve-in-head engine. The big displacement, plus a 7.3:1 compression ratio, provides 57-brake-hp at 1,750 rpm. One of the easiest engines to service, the power plant incorporates removable cylinder heads and blocks cast in pairs; a rigid, single-unit crankcase and base pan; and a removable side cover. It is completely pressure-lubricated with a full-flow filter and float-type screened intake. A 12-v electrical system, pressure cooling, and a new centrifugal ball governor are standard.

A 13-in. cast aluminum torque converter with 3-to-1 multiplication is available as optional equipment for the new Golden Kat crawler. Available with the torque converter is a reverse shuttle gear that incorporates a neutral gear to permit easy shifting of the five-speed sliding-gear transmission.

The model 445 Industrial Wheeler carries the 206-cu-in. engine, but the other new wheel tractor, the model 335, is powered by a 165-cu-in. engine of similar design. Both tractors are expressly designed for industrial use; they feature a rugged main frame, beefed-up axles and wheels.

Cummins

EIGHT DIESELS, including three completely new engines, will make up the Cummins display at the Road Show. In addition to its own exhibit, Cummins will also be represented at the booths of more than 20 other manufacturers who will show equipment powered by Cummins diesels.

The three new Cummins diesels are an eight-cylinder, 375-hp naturally aspirated engine with a 783 cu in. displacement; a four-cylinder, 60-hp naturally aspirated engine with a 267 cu in. displacement; and a new six-cylinder, 375-hp NFT-6 Turbodiesel power unit with a 743 cu in. displacement.

Cutaway models at the Cummins exhibit will include the popular 335-hp NRTO-6 and the 600-hp VT-12 engines. Both are turbocharged. Other models on display will be a 100-kw generator set powered by a NRT-6 diesel, a JIPS-600 engine with a torque converter, and a pumping unit powered by a JN-6-IP engine.

Continued on next page

Blaw-Knox Unveils Smaller Paver

COMPANY OFFICIALS call the new Blaw-Knox PF-45 black top paver a little brother of the popular PF-90 paver, but they say it will do a lot more than just half the work of the bigger unit.

The new black topper is 14 ft long with a base width of 11 ft. It is equipped with two 10:00x15 tires on the drive wheels. Front wheels, under the 4-ton, 10-ft wide hopper, are solid rubber with two tires on each wheel. Powered by a Continental F-162 gas engine that develops 30 hp at 1,500 rpm, the machine has six working speeds and a top travel speed of 8 mph.

Maximum width of the screed is 11 ft. Sections of screen can be blocked or removed to pave down to 8-ft widths. Hydraulic controls lift the screed for 8½-in. clearance. Tamping action is vertical with a speed of 1,000 rpm at 1,300 engine rpm. The PF-45 is priced at about half the cost of the bigger PF-90.

Another Blaw-Knox development is a new hydraulic concrete bucket in which the power for operation is entirely self-contained. According to company officials, this development marks the beginning of the end of production of air-powered buckets by Blaw-Knox.

The hydraulically dumped bucket immediately does away with one headache because it requires no air, so a compressor is not needed on the job and there is no air hose to bother with.

The weight of the bucket is used to generate the needed pressure for operating the clam discharge gates. The bucket hangs from its pendant on two hydraulic cylinders. A lever on the hydraulic valve permits the bucket's weight to transmit pressure to the gate cylinders, and the gates are opened. The hydraulic system contains enough oil to empty a portion of the bucket's load, close the gates, and then reopen them for a second pouring. When the bucket is set down, the spring-loaded pendant drops, and the oil flow is reversed to recharge the bucket.

The initial hydraulic bucket is Blaw-Knox's 4-yd model. The company plans development of 2, 3, and 8-yd hydraulic buckets in the near future.

Harnischfeger

A 40-TON capacity P&H truck crane—said to be one of the easiest of its size to move over roadways—will be spotlighted by Harnischfeger at the Road Show.

To increase its mobility, both the crane and the carrier are designed to spread the load over four axles. Called the model 575A, the new crane incorporates many of the features found in previous P&H units: hydraulic controls, independent boom lowering through planetary gears, a boom hoist with three independent safety features.

Harnischfeger also plans to display its popular P&H model 1055 3½-yd capacity crawler excavator.

Lima Introduces 3-Yd Shovel

A NEW Lima shovel equipped with a 28-ft boom, 22-ft handle, and 3-yd dipper will be the standout attraction at Baldwin-Lima-Hamilton's Road Show booth. As a high-lift shovel, the new unit (model 1250) can be equipped with a 45-ft boom, 32-handle, and a 2½-yd dipper.

For special crane service the same basic excavator is designated the 1250-SC. Designed especially for sky-scraper duty, it swings up to a 200-ft boom and 50-ft jib. With a 60-ft boom, the unit has a lifting capacity of 100 tons at a 13-ft radius. An independent twin-drum worm-and-gear boom hoist provides fast and safe booming with big loads.

The 1250 has a one-piece carbon-steel rotating base, telescopic boom stop with automatic shutoff, large dia clutches and brakes, and torque converter drive. Crawlers are available in two widths, two lengths, and two treads. Two types of rigid gantries and two types of folding gantries are also available.

Other excavators, as well as the new Lima Roadpacker will also be on display. B-L-H's Austin-Western Works will present a new screening and crushing plant that features economy of operation and maintenance. Most of its components are driven by individual electric motors that eliminate chains, idlers, sprockets, and clutches. All operations on the closed circuit, diesel-electric plant are controlled by pushbuttons from the operator's platform.

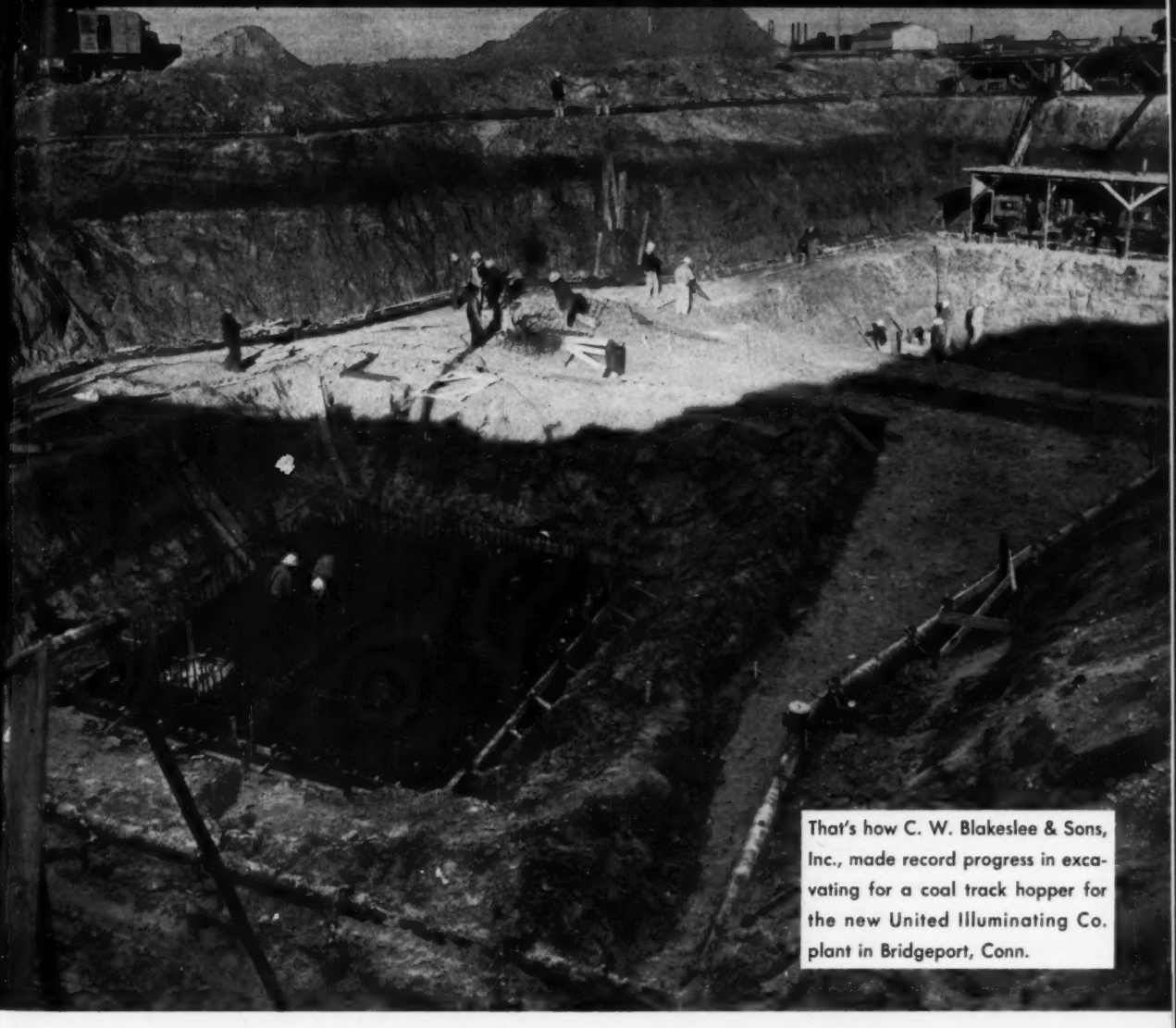
The 101-SE plant, which also can be furnished with straight mechanical drives, weighs approximately 60,000 lb. It consists of a 4x12-ft, 2½-deck inclined gyrating screen, a 1036 roller-bearing jaw crusher, a 3020 star-driven roll crusher, and a 30-in. x 20-ft front delivery conveyor. Optional equipment includes a feed conveyor with a 30-in. mechanical feeder and an 18-in.x20-ft sand reject conveyor. The plant is mounted on a rugged steel frame.

Sharing top billing at the A-W exhibit is the new Super 99 Power Grader—a six-wheel-drive motor grader that is the largest and most powerful of the firm's four graders.

Continued on page 212

"How Do You Handle 32′ of Water in Fine, Silty Sand?"

"Nothing to it—Install a MORETRENCH WELLPOINT SYSTEM and Go Ahead—*IN THE DRY*!"



That's how C. W. Blakeslee & Sons, Inc., made record progress in excavating for a coal track hopper for the new United Illuminating Co. plant in Bridgeport, Conn.

A two-stage Moretrench Wellpoint System was so effective in stabilizing this soil that sheeting (originally planned on) was entirely eliminated resulting in considerable savings.

After the lower ring of wellpoints was installed, one pump only on 200 wellpoints kept the job in bone dry shape.

Any wonder that more and more contractors prefer to work with MORETRENCH *IN THE DRY*?

Call us when you have a wet job!

MORETRENCH CORPORATION

90 West St. New York 6 | 4900 S. Austin Ave. Chicago 38, Ill. | 7701 Interbay Blvd. Tampa 9, Florida | 315 W. 25th St. Houston 8, Texas | Rockaway New Jersey

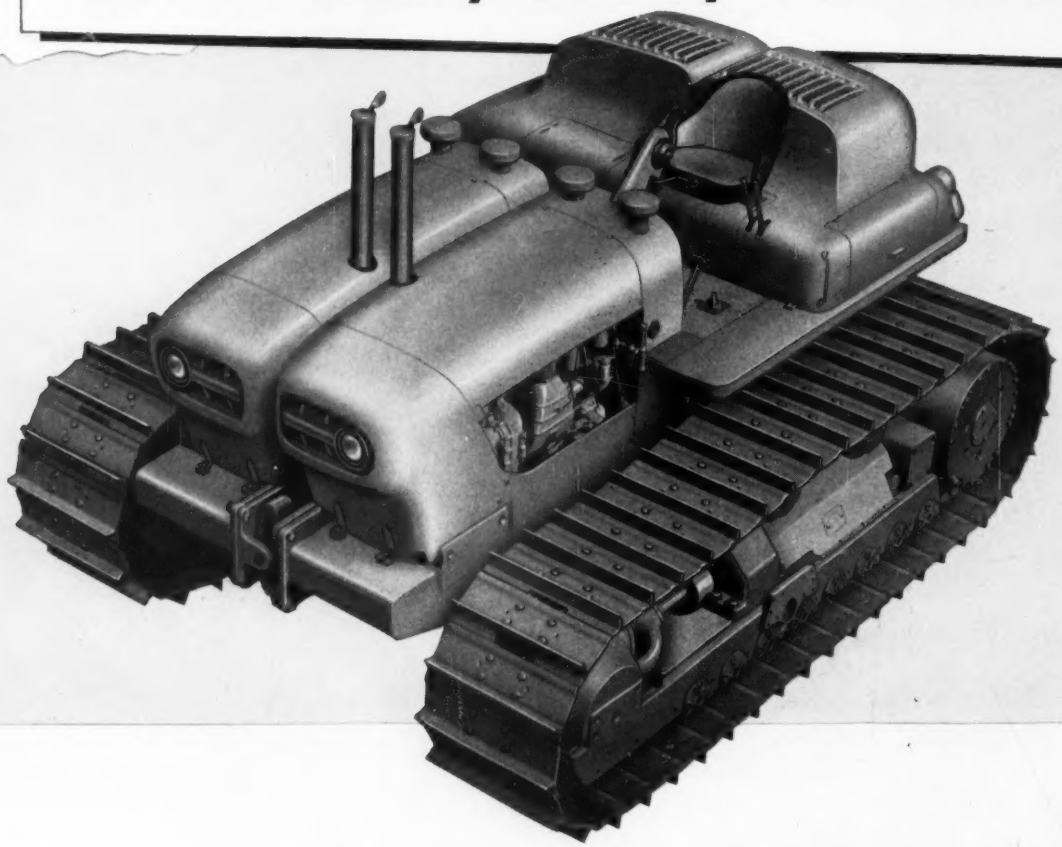
Western Representative: Andrews Machinery of Washington, Inc., Seattle 4, Washington

Canadian Representative: Geo. W. CROTHERS Limited, Toronto, Ontario

Brazilian Representative: Oscar Taves & Co., Ltd., Rio de Janeiro

NOW THE Euclid TC-12 GIVES YOU

more horsepower... more track area... more accessibility than any other crawler!



Ever since it was introduced more than a year and a half ago, the Euclid TC-12 Tractor has set completely new standards of crawler production and performance. It has proved, on job after job, that it is years ahead of the field in ability to do more work—faster, easier and cheaper. Now the TC-12 has even more power to handle the biggest tractor jobs.

Powered by two 218 h.p. engines with separate Torqmatic Drives for each track, there's a total of 436 horsepower. Big 27″ standard shoes and 8 track rollers give good balance with the additional horsepower, heavy duty dozer blades and other attachments.

This new TC-12 Crawler has many other improvements that put it even further ahead of other tractors . . . in performance, ease of operation, maneuverability and service accessibility. Ask your Euclid dealer to prove that the TC-12 has no equal for big tractor jobs and have him show you why ***Euclids are your best investment.***

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

EUCLID

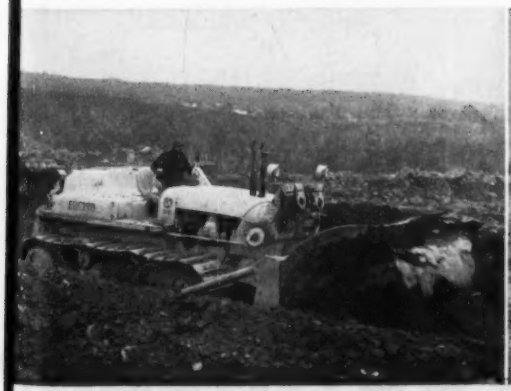
GM MORE POWER FOR YOU

20% MORE WORK-ABILITY

Euclid "Twins"—the TC-12 Tractor and Twin-Power Scraper—will move the cheapest dirt on the big road program or on any earthmoving job. They can set new production records at lower cost on your operations.

The Euclid TC-12 has exceptional maneuverability because each track has a separate power train. Operator has excellent visibility and "hair trigger" control of steering in any of the three speed ranges, forward or reverse.

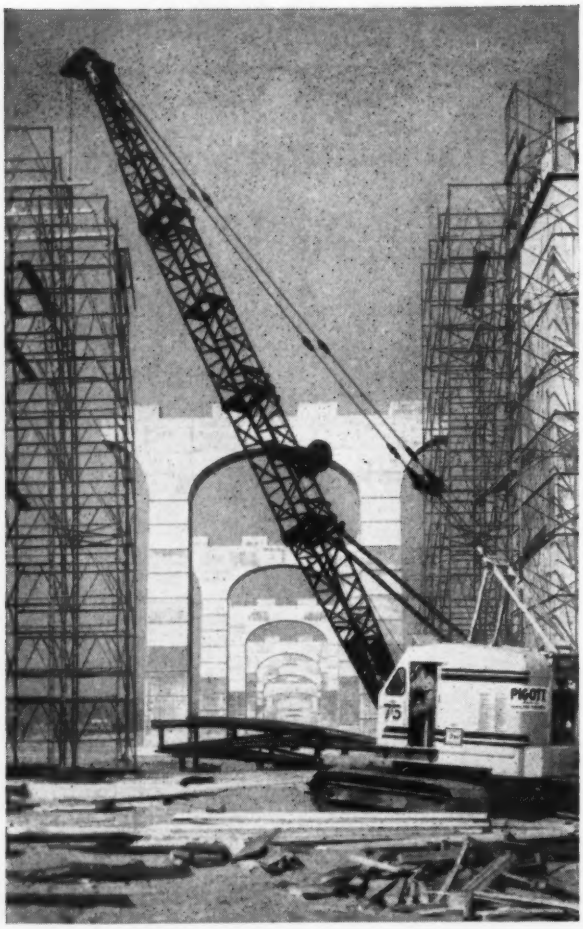
With separate Torqmatic Drive for each big track, the TC-12 is fast on its feet, with plenty of power and traction for any big tractor job. It has proved its ability to outwork any other tractor on dozing, clearing, push-loading scrapers and pulling big equipment.



A high production machine, the TC-12 is easy to operate—delivers more push-pull drawbar horsepower at high travel speeds. Unitized assemblies and easy accessibility of major components permit servicing without major tear-down of other parts.

For push-loading big scrapers the Twin-Power "Euc" crawler has no equal. Torqmatic Drive provides a smooth, steady flow of power—changes from one speed range to another and from forward to reverse are made under full power.

When you buy equipment
STANDARDIZE



GAR WOOD 75B EXCAVATORS give you the capacity you need, the easy convertibility you want to handle a wide range of jobs. Available on crawlers or as highly mobile 20-ton truck crane. Both units are fully convertible with a complete line of ¾ yard attachments.

GAR WOOD - ST. PAUL DUMP BODIES, matched with Strong-Arm hydraulic hoists, deliver the payloads you need at a lower net cost per payload hour. The line includes standard-duty, heavy-duty, extra-heavy-duty and telescopic models.

GAR WOOD TRACTOR EQUIPMENT reflects many years of construction machinery engineering experience. Gar Wood's line for Euclid includes a Tipdozer, Dozecaster, revolutionary new ripper and both hydraulic and cable control units.

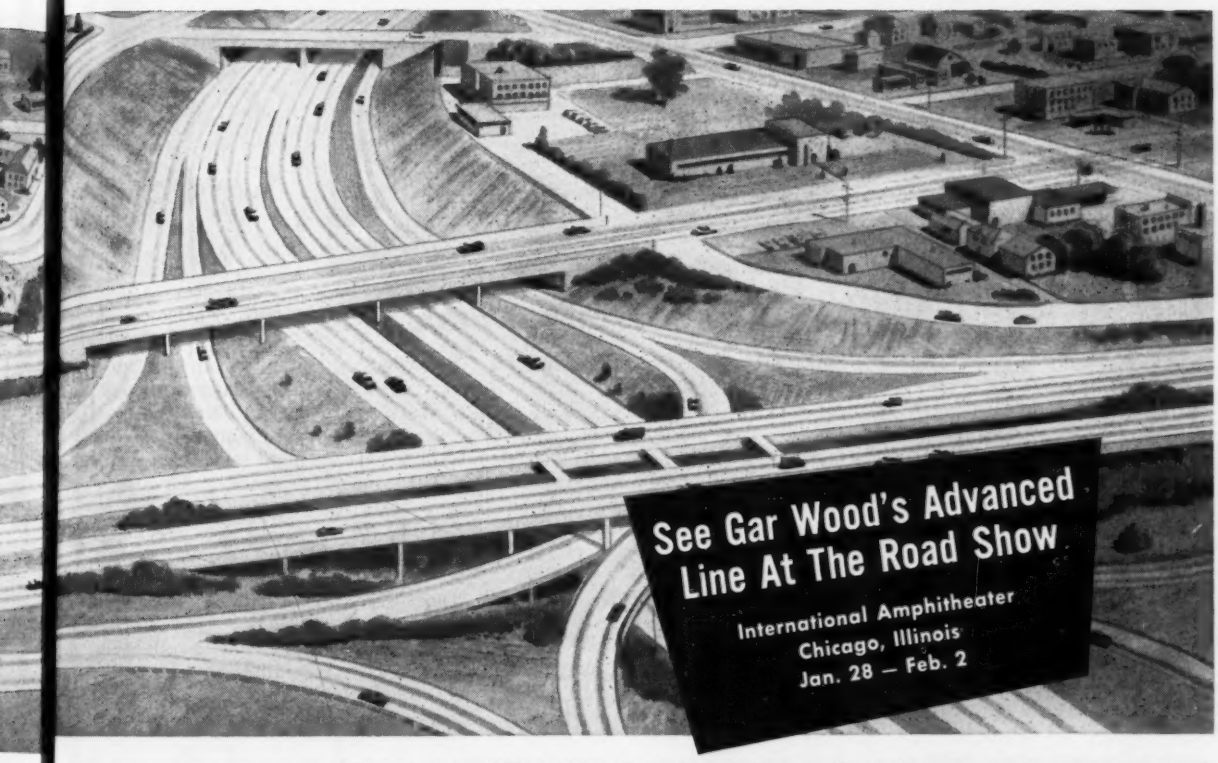
GAR WOOD-BUCKEYE SPREADERS give you the speed you want, the accuracy you need to distribute materials at lowest cost. Hitching is fast, safe and automatic. Flow is accurately regulated for uniform or tapered spread.

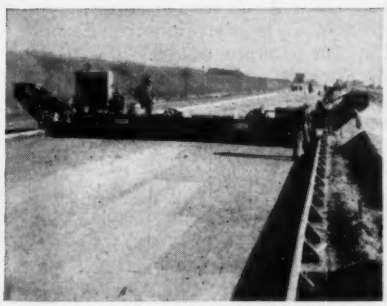
GAR WOOD INDUSTRIES,

PLANTS IN WAYNE AND YPSILANTI, MICH.;

for the road ahead,

ON GAR WOOD AND SAVE!





GAR WOOD-BUCKEYE FINEGRADERS can contribute to bigger paving profits. They are easily operated by one man . . . can produce up to 420 feet of 24-foot grade per hour exactly to specifications.

GAR WOOD-BUCKEYE'S HI-WAY WIDENER digs up to a mile of clean, graded trench per day. It is the only low-cost, one-pass method of excavating and subgrading along the shoulder on highway-widening jobs.

GAR WOOD-BUCKEYE DITCHERS have been digging "more ditch per dollar" for more than 60 years. You'll find today's most advanced ladder- and wheel-type models in the complete Buckeye line.

INC. Wayne, Michigan

FINDLAY, OHIO; MATTOON, Ill.; RICHMOND, CALIF.

LeT-W Beefs Up B Tournapull

IN ADDITION to several completely new rigs that will be unveiled at the Road Show, the LeTourneau-Westinghouse exhibit will feature an improved version of the popular B Tournapull with a larger Full-Pak scraper, and four animated working models of LeTourneau - Westinghouse machine components.

Of major interest will be an easily understood working cutaway of the company's Power Transfer differential. This display will show how power moves from one wheel to another if ground conditions should cause one wheel to lose traction.

The scraper for the Model B Tournapull has been redesigned so that its capacity is now a full 27 yd heaped. The self-propelled, two-axle scraper's prime mover has also been restyled and made more powerful. Other LeTourneau-Westinghouse equipment on display will include the C Tournapull with a scraper, the D Tournapull with an 11-ton rear dump, and the powerful Twin C tractor —a pusher unit powered with two GM diesels that deliver a total of 416 brake hp.

Two Adams Power-Flow graders —the torque converter - equipped model 660 and the 60-hp model 220—will also be displayed.

Universal

A PORTABLE CRUSHER PLANT that combines a wobbler feeder with Universal's 3654 Impact Master crusher will be displayed by Universal Engineering Corp. at the Pettibone - Mulliken Road Show booth.

In operation, the material removed by the wobbler is deposited on a conveyor receiving crushed material from the Impact Master. This eliminates feed stoppages and reduces wear on the crusher's rotor hammer by taking out all 2-in. minus material ahead of the crusher. If large amounts of mud or dirt are present, the wobbler deposits its material onto a waste conveyor. Because of its high reduction ratio, the plant can be hooked up for closed circuit operation.

Case-TerraTrac Expands Line

SEVERAL ORIGINAL CONCEPTS in crawler tractor design are featured in two new TerraTrac crawlers—the first units to bear the Case label following the recent merger of the J. I. Case Co. and the American Tractor Corp.

The new crawlers are the 80-gross-hp model 800 and the 100-gross-hp model 1000. In addition, Case is also introducing a new line of medium sized industrial wheel tractors and attachments.

From the operator's viewpoint, the most dramatic feature of the new crawlers is a counter-rotating TerraTrac hydraulic transmission that provides independent power control of each track for both speed and direction.

As a result, the operator can turn his rig around three ways: (1) he can pivot turn by braking one track; (2) he can make a power-turn by putting one track in high and the other in low; and (3) he can make a fast 360-deg spin-turn within the tractor's own length by driving one track forward and the other in reverse.

With the model 1000, the operator can make power turns within a 11-ft track radius. He can also pivot 360 deg within a track radius of 7½-ft, or he can spin around within a track radius of only 5 ft 7 in. All machine movements are controlled by four hydraulic clutch levers, a manual speed-range selector, a foot accelerator, and two hydraulic foot brakes.

Besides the three-way steering feature, the new TerraTracs offer a power-shifting constant mesh transmission, a Borg-Warner torque converter, and exceptionally high reverse speeds. Both machines have four speeds forward up to 6 mph, plus four reverse speeds to 7 mph.

Another feature of the new TerraTracs is a torsion-bar track-suspension system that makes it possible for each track to oscillate freely over irregularities in ground surfaces.

The new crawlers are available with a complete line of matched equipment including 1½ and 2-yd loaders and an angling dozer blade that is controlled hydraulically from the driver's seat. Another new attachment is a straight bulldozer that tips fore and aft and also tilts for ditching and crowning jobs.

Besides the crawlers, Case is introducing the first models of a new line of medium-sized wheel tractors. The Case industrial line now offers 20 gasoline and diesel units ranging from 40 to 80-hp in the rubber-tired models and up to 100-hp in crawler models. Over 50 combinations of matched equipment are available.

Company spokesmen indicate the new rigs are only the first step in an aggressive program of product development. "With seven modern plants and over 7,000,000 sq ft of manufacturing facilities, Case has plenty of capacity for major expansion," says Marc B. Rojtman, former American Tractor Corp. president and Case's executive vice president and general manager.

Continued on page 216

NEW THOR SELF-PROPELLED ONE-MAN DRILLCAT

First on-the-job reports prove Drillcat delivers more work, bigger profits, in less time

CHECK THIS PROOF DIRECT FROM THE JOB

PAID FOR ITSELF IN ONE JOB

A net profit of $15,000 in one week on rock drilling jobs was reported by one contractor—another, equipped with five Thor Drillcats paid for them in three months from extra profits.

SAVES OVER 2½ HOURS SET-UP TIME

You can set a Thor Drillcat in drilling position—ready to go—in 20 to 25 minutes.

FAST WHEN THE GOING IS TOUGHEST

One man on a Drillcat tugged a 600 c.f.m. air compressor ½ mile over rough terrain, drilled five holes and was back with equipment at his starting point in only two hours.

DRILLING TOE HOLES. The Thor Drillcat is completely flexible. The boom and mast are lowered flat to the ground for toe and lifter holes. Twin reversible drive air motors permit easy maneuvering to any position, any angle. (Note position of controls for easy operation.) A "dead man" control for all air valves is standard equipment on the Drillcat.

DRILLING DOWN HOLES. Two 7½ h.p. air motors propel this compact (6 ft. 9 in. overall) Thor Drillcat where no other crawler can go. More than enough power to pull its own air supply. Drilling down holes is no chore for Thor's Drillcat. Using the powerful model 105M drifter and chain feed mast, the hydraulic accumulator keeps boom rigid at all times. This means less steel breakage and less wear on chuck parts.

These exclusive features make Thor model MM-2 Drillcat the most productive rock-drill you can buy! Ask any Thor distributor for a Drillcat demonstration.

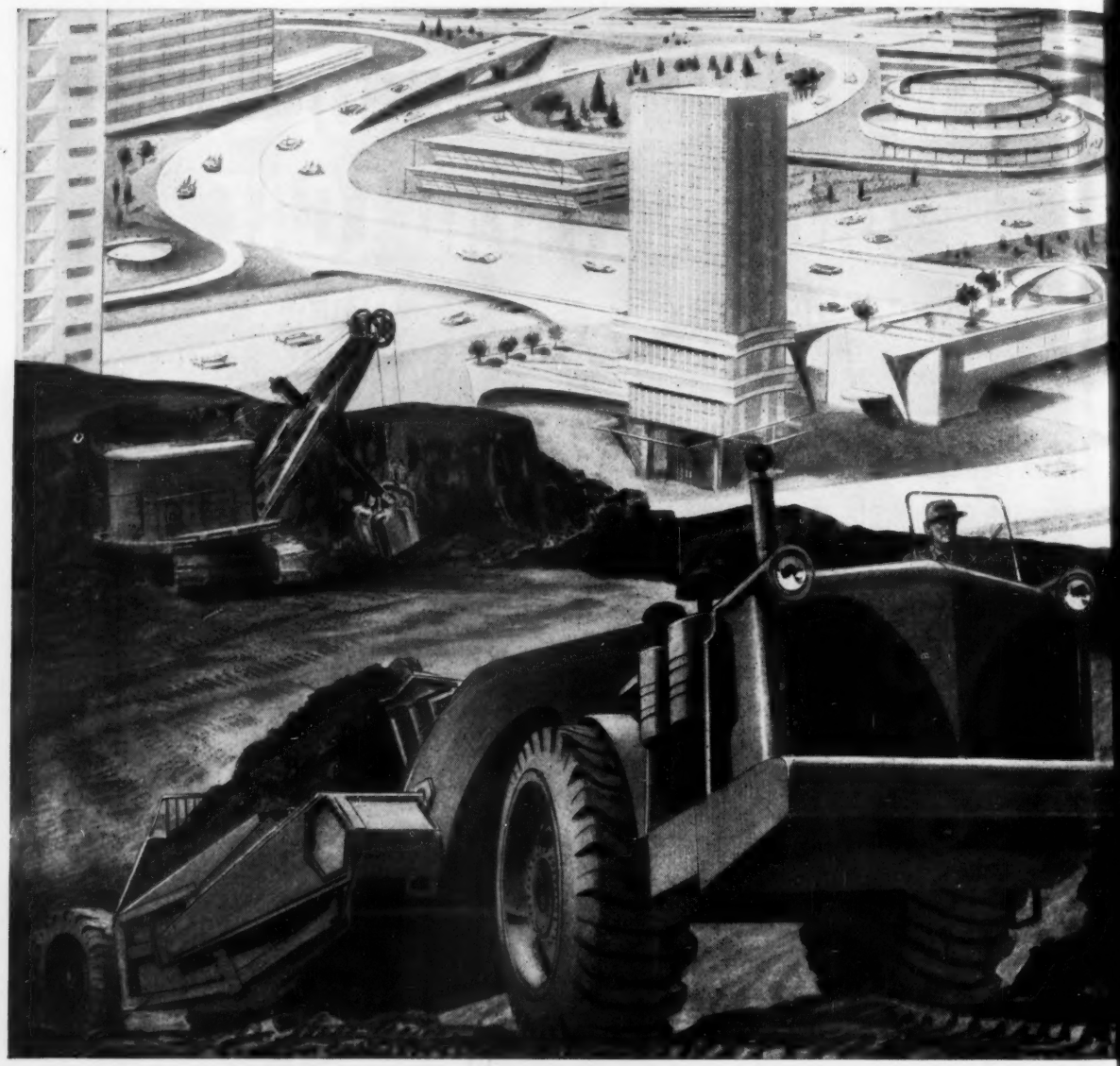
● Thor's super-powered 105M drifter rock drill. ● Rugged Thor BW-2 wagon drill mast and air control motor. ● Self-propelled with two 7½ h.p. Eimco air motors, power aplenty to haul itself and air supply. ● Rigid frame, proved in tractor design, no moving or wearing parts, long lasting, low maintenance. ● Aircraft-type accumulator in hydraulic system absorbs shock. ● Simple hand-operated track take-up. No tools required. No track locks required. ● Large flat platform. Ideal for operator when drilling toe holes, good for tool and fuel storage.

VISIT THOR EXHIBIT, ARBA SHOW

Booth 706, Section D, International Amphitheatre
Chicago, January 28 through February 2

Thor
PORTABLE POWER
TOOLS

THOR POWER TOOL COMPANY
Aurora, Illinois
Branches in all principal cities



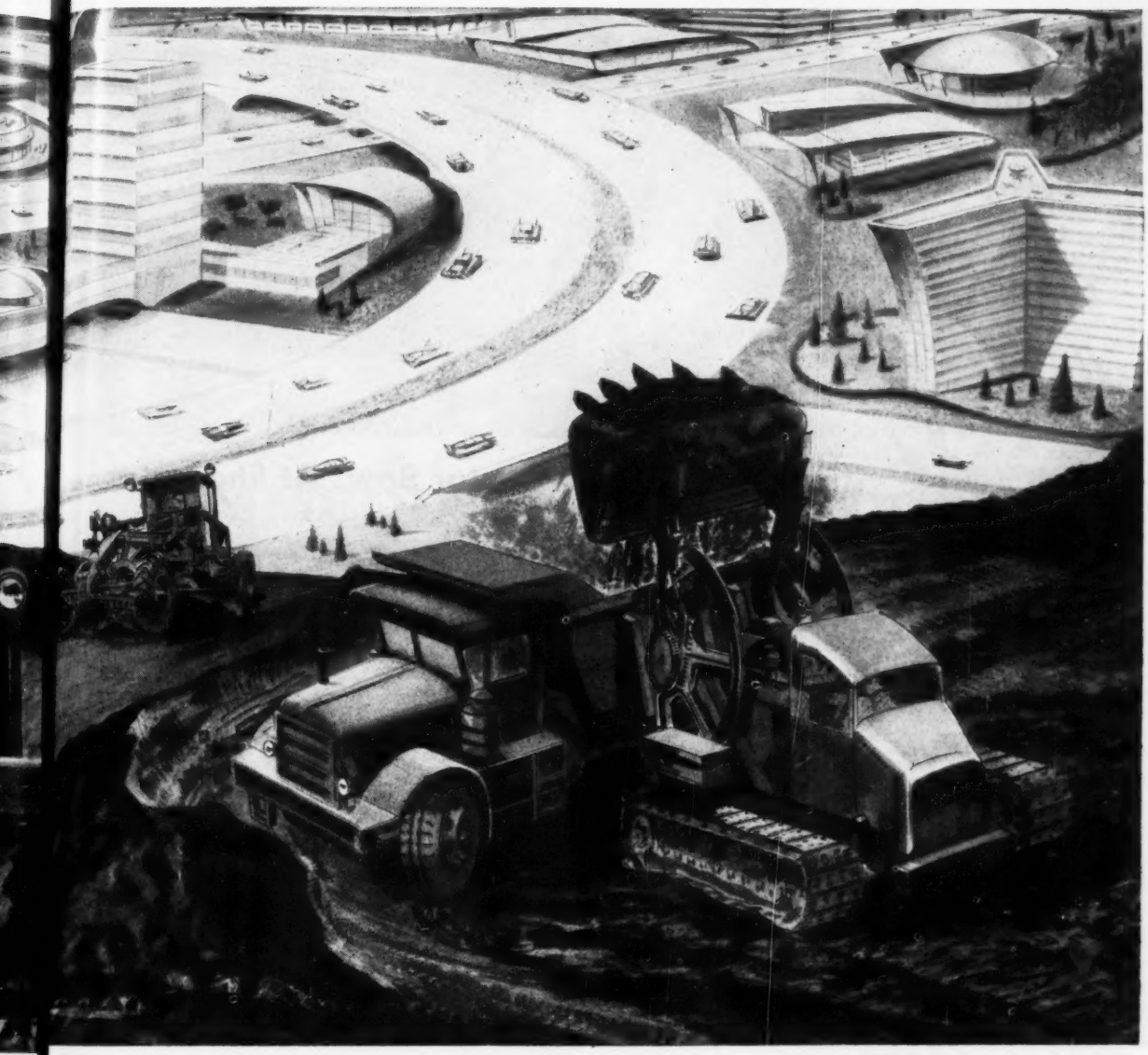
Multiplies muscles–*speeds*

COUNTRYSIDE, U.S.A. – from Cape Cod to the Golden Gate, from Mackinac to Mexicali – is being readied for the biggest "face lifting" job in history – for the great new network of turnpikes and throughways to serve the needs of an impatient motoring public.

"Operation Facelift" is underway – speeding today's byways into tomorrow's highways. And, pitting giant muscles against this tremendous task is the newest road-building equipment. For modern machines are the key to modern roads.

The *most modern* of these giant road-building machines have one point in common – TORQMATIC DRIVE. For manufacturers and contractors alike find TORQMATIC equipment works faster from first cut to final paving. TORQMATIC Converters match engine power to load demand – multiply torque for bigger "bites" with less strain. TORQMATIC Transmissions provide continuous full-power shifting–forward and reverse – for quicker completion of every job. And, TORQMATIC DRIVES make every machine easier to operate, reducing the need for extensive operator training.

122 kinds of construction equipment built by 55 different manufacturers are *now* available with



byways into highways

TORQMATIC DRIVE. You'll see many of them on display at the ARBA Show in Chicago. And, we'll be looking for you at the Allison TORQMATIC Display, too, where we'll show you how TORQMATIC DRIVES can give your equipment *new utility—new efficiency—new economy*. For further information, write: Allison, Division of General Motors, Box 894T, Indianapolis, Indiana.

See you at the ARBA Show, Chicago, January 28 through February 2

Allison

TORQMATIC DRIVES

GM TORQMATIC

McKiernan-Terry Has New Hammer

A SELF-CONTAINED diesel pile hammer that requires neither boilers nor compressor will highlight McKiernan-Terry's exhibit.

Two models will be on display. The DE-30 has a 3,000-lb ram delivering 45 to 55 strokes per min with an average energy per blow of 18,000 ft-lb. It is designed for driving 1 to 3-ton piles at bearings of from 40 to 90 tons.

The other model is the DE-20, which has a 2,000-lb ram that delivers 45 to 55 strokes per min with an average energy per blow of 12,000 ft-lb. It will handle ½ to 2-ton piles at bearings from 25 to 60 tons.

Chevrolet

REPRESENTATIVE MODELS of Chevrolet's 1957 Task Force Fleet, the largest and most powerful trucks ever produced by the company, will be displayed at the Road Show.

Chosen for their application to road building, the Chevrolet trucks will include a new heavy duty unit with 210-hp engine, six-speed Powermatic transmission, and 18,000-lb capacity rear axle. A low profile, cab-forward model will be equipped with a 2½-yd dump body.

Cutaways of the engine, transmission, and rear axle will be arranged in sequence so that spectators can follow the action from the stroke of the pistons to the gear movements in the axle.

Link-Belt

DURING the past 30 months, Link-Belt Speeder Corp. has redesigned almost its entire line of shovel-cranes. The firm's Road Show exhibition will be based upon four units that illustrate the design advances recently introduced.

These will be a 30-ton HC-98 truck-crane with a heavier new four-axle carrier; the crawler base for a 1-yd model LS-98; the upper machinery (with cab removed) for the 98 series shovel-cranes; and a cutaway working model of Link-Belt's Speed-O-Matic power hydraulic control system.

Versatile Compactor Bows At Show

SEVERAL recent developments in low-cost equipment for grading, earthmoving, and soil compaction will be shown by Seamon-Gunnison Corp. at the Road Show. In addition to the Duo-Pactor, the exhibit will feature the new Duo-Grader and the Duo-Scraper.

All of these units can use the same prime mover (a modified International utility wheel tractor). Thus, with only one prime mover the contractor can excavate, haul, fill, spread, compact, and perform a variety of other jobs.

The Duo-Pactor, which was the first compactor to offer both pneumatic-tire and steel-roll compaction in one unit, has been made even more versatile. It is now available with a sheepsfoot roller that interchanges with the drive wheels on the tractor, and it can also be equipped with a vibrating unit. Thus, with one compactor, the contractor can use rubber, a steel roll, a vibrating roll, or sheepsfoot tampers—and he can use several means of compaction at the same time.

The Duo-Scraper will be available in two, three and five yd models. It is self-loading, and it can be equipped with pneumatic rolls for compacting materials as they are spread.

Cat Expected To Unveil New Rigs

INCLUDED IN CATERPILLAR'S huge 27,000-sq-ft Road Show exhibit will be nine crawler tractors, six rubber-tired tractors, three Traxcavators, two motor graders, and ten power plants. In addition, Caterpillar is expected to introduce several completely new rigs—probably including extensions of their equipment line.

The king of the Cat line, the D9 crawler tractor, will have a place of honor at the exhibit. Now nearing its second birthday, the engine horsepower of the D9 was boosted recently to 320 at the flywheel. The direct drive model now produces 260 hp at the drawbar.

Another innovation is Cat's new Gyro Dozer, a blade that can be tilted and pitched hydraulically from the operator's seat. Because of its new design, and because the operator has full control of every blade position, Cat claims the new blade can handle up to 50% more material than standard blades under some job conditions.

Whenever possible, Caterpillar will show its prime movers with a wide selection of matched equipment. The crawler line, for instance, will mount rippers, stumpers, dozers, pipe layers, winches, and backhoes.

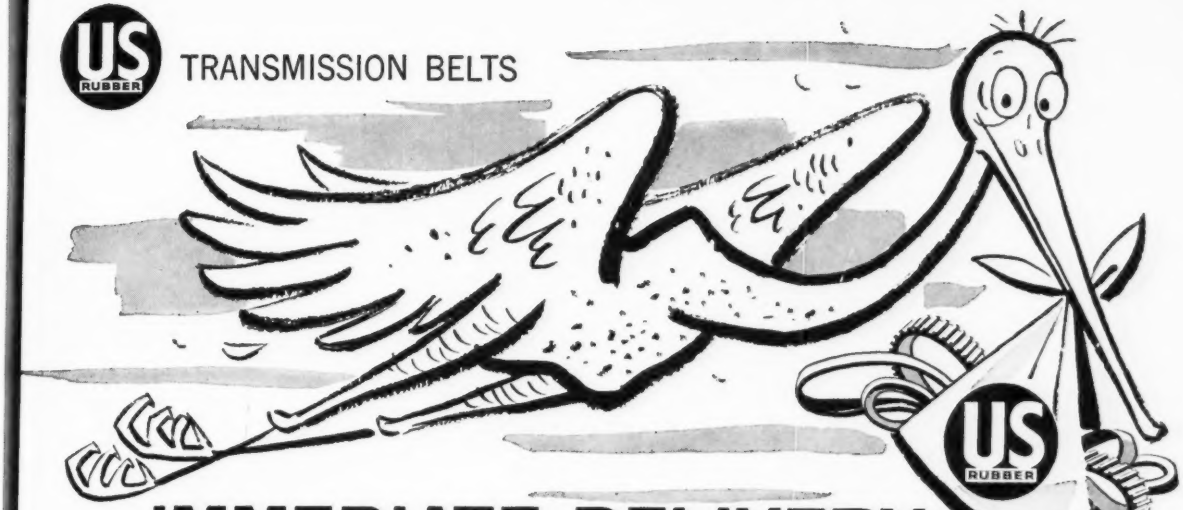
One of the most interesting machines on display will be a DW20 wheel tractor with all of its paint removed to show design details. Behind the DW20 will be a cutaway of a No. 456 Lowbowl scraper. Other cutaways will include a No. 470 scraper, the 8A and 8S dozers, and four engine models.

To demonstrate the versatility of its Traxcavators, Cat will show one model mounted with a standard front-end loader bucket, another with a side dump bucket, and a third with a Fleco rock rake and a Hyster towing winch.

Continued on page 288

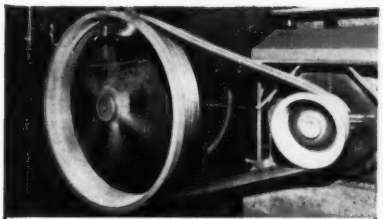
US RUBBER

TRANSMISSION BELTS



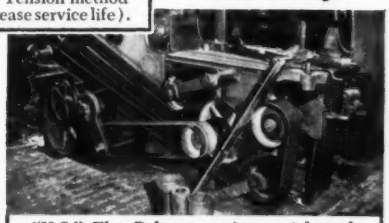
IMMEDIATE DELIVERY

from a Complete Line



The complete V-Belt line includes famous U.S. Rainbow®, U.S. Royal Super-Service, and fractional horsepower belts (made by the error-proof Electronic Tension method to eliminate vibration, increase service life).

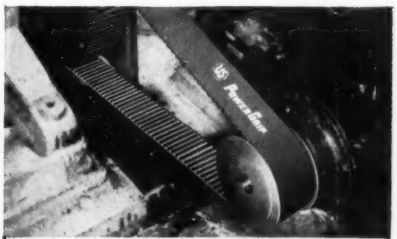
FLAT BELTS
V-BELTS
TIMING BELTS
All Sheaves and Pulleys



"U.S." Flat Belts come in special cord-constructed endless lengths or in duck roll belting. "U.S." production techniques guarantee *quality* performance.

"U.S." is really geared to deliver. You really get immediate delivery or shipment—thanks to your local "U.S." distributor backed by the strategically located District Sales Offices and transcontinental chain of warehouses. The "U.S." Transmission Line includes flat belts and belting, V-belts, sheaves, and PowerGrip "Timing"® Belts and pulleys for any power transmission need.

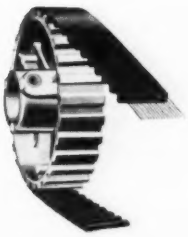
These belts, sheaves and pulleys—plus expert engineering assistance by power transmission specialists—are available at "U.S." power transmission distributors, any of our 28 District Sales Offices, or write us at Rockefeller Center, New York 20, N. Y.



The PowerGrip "Timing" Belt was awarded the Franklin Institute's 1955 Longstreth Medal—for "invention of high order." By providing near-100% efficiency in positive, non-slip, split-second timing, it has become standard equipment in a wide variety of machines and appliances.

V-Belt Sheaves and "TIMING" Belt Pulleys

are tested for static balance and engineered to deliver the high durability and efficiency that are built into every "U.S." Belt.



US RUBBER

Mechanical Goods Division

United States Rubber

Macks ARE HANDLING THE IMPORTANT JOBS

building the National Highway System!

The road boom's underway! Up to 33 billion dollars worth of new highways to be built. And right now, you're probably asking yourself:

"What kind of hauling equipment will net me the greatest return?"

For the best answer . . . ask any of the thousands of construction firms that have learned to rely on Macks. They'll tell you that their best investment is the kind of equipment that can handle the most punishing loads over the worst terrain and footing without losing precious contract hours for overhaul or repair.

And they'll tell you—*Mack's got it!* Got it in the powerful dependability of the famous Mack engines. Got it in the famous Mack Balanced Bogie with the exclusive Power Divider that allows Macks to move in and work where other trucks bog down. In the many, many other features that have made "Built like a Mack" a trade term for the utmost in stamina, dependability and strength.

Best of all—there's a Mack for every important hauling job. Take a look soon at the Mack 4- and 6-wheel haulers, dumpers and concrete-mixer models . . . with capacities up to 34 tons. You'll quickly see why, wherever you see important work, you'll generally see Macks in action. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

Mack

FIRST NAME FOR TRUCKS

This planned vast national superhighway network will be built by Federal and state government co-

Mack B63
Mack
Thermodyne
B63 Mack
Diesel
Mack B80
woodi

Which tires would you put on this truck?

SITUATION: Excavating for highway between Bonne Terre and Halifax, Missouri, Clarkson Construction Co. trucks haul dolomite from 1,000-ft. long, 20-ft. deep cut to nearby fill. Terrain—rough, with steep 30° downgrade. Average load of 23.49 cu. yds. weighs 61,074 lbs.

FIRESTONE'S RECOMMENDATION: Rock Grip Excavators for dual drives withstand load shocks, ward off cuts and bruises. Angled treads prevent side slipping. Rib Excavators up front make steering easier. These tires are built with tough cut-resistant tread rubber and Safety Tensioned *Gum-Dipped*® nylon cord bodies for extra strength and impact resistance.

JOB RESULTS: Clarkson trucks operate 10 hrs. daily in 5-min. cycles. *No downtime has been caused by tire failures!* Operators express complete satisfaction with lowered costs and raised performance standards, directly resulting from the recommendations of their Firestone Sales Engineer. He's the man who knows all tires and understands how to use them best for your profit, too. Contact him today—through your local Firestone Dealer or Store.

SUPER TRANSPORT

Most widely used heavy-duty tire for long, low-cost highway performance.

SUPER ALL TRACTION

Rugged, deep treads for off-road traction; smooth highway operation.

ROCK GRIP EXCAVATOR

Toughest tire ever built for severe off-road service. It's cut-resistant too!

RIB EXCAVATOR

Rugged, thick-bodied tire with great lateral stability for easy steering action.

Firestone

Enjoy the Voice of Firestone on radio or television every Monday evening over ABC

Copyright 1957, The Firestone Tire & Rubber Co.

Construction Methods
describes some devices contractors have worked out
to build faster and easier

INGENUITY IN ROADBUILDING

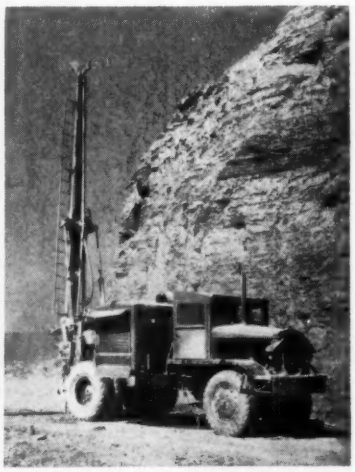
- *Preparing the base*
- *Paving tricks*
- *Joints made easy*
- *Finishing ideas*

Rig the Drill For the Job

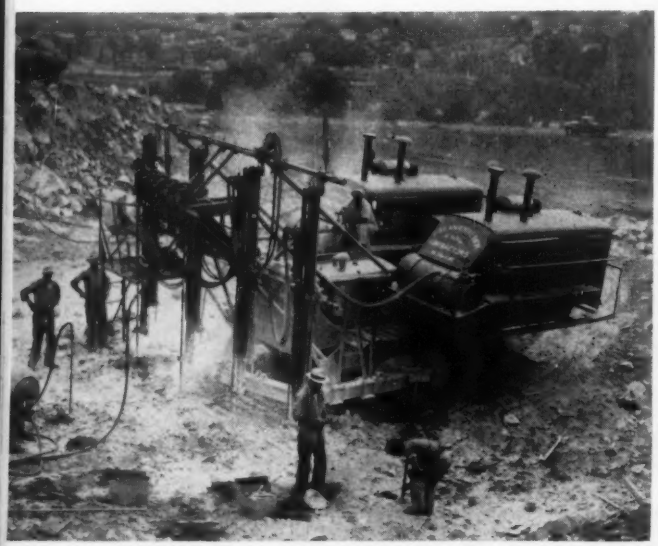
As long as contractors have to push roads through rock as well as earth, finding ways to cut down on drilling time will be important to the roadbuilder's art.

SWIVEL BOOMS mounted on the front of a D8 tractor give this contractor a wide radius of drilling operation without frequent changes in tractor position. It also permits drills to be operated wholly independent of each other. The booms are hydraulically powered.

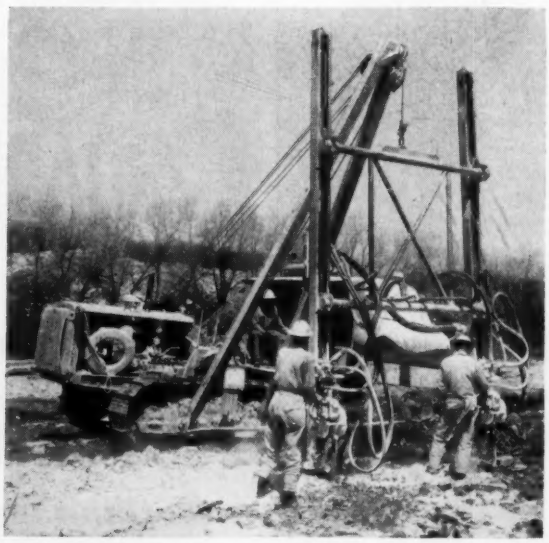
V-BELT transmits power from rear take-off to compressor mounted on side of tractor. This compressor is a Worthington 600. U-frame mounted on the front of the tractor had been fabricated from welded pipe and doubles as a drill mount and air receiver.



TRUCK MOUNTING of single drill and compressor creates a speedy and highly maneuverable unit of roadbuilding equipment.



FOUR-DRILL rig with twin compressors on tractor makes a high production unit capable of drilling an average of 1,300 ft of blast holes daily. Drills are operated from one-man panel on boom.



SIDE-BOOM MOUNTING of two drills on a Cat D8 tractor, along with compressor, proves handy when a long line of blast holes has to be drilled with a minimum amount of tractor relocation.

BLADE welded to International Drott TD-9 Skid Shovel digs trenches 22 in. deep and 28 in. wide, costs $100. It angles 15 deg forward from bucket and is supported by angle irons.

SIDE BUCKET attached to Michigan loader grades 3-ft-wide shoulder area next to slab.

Shoulders And Widening Can Be Made Easier, Too

No method of doing any job is so fixed it can defy the roadbuilder's healthy imagination.

continued on page 227

DROP BLADE grader attachment finishes shoulders. Steel plate keeps dirt off slab.

TRUCK RAMP is pulled by cable attached to Caterpillar tractor. Attachment allows dump truck to back down off existing paving into boxed out section where it can unload.

VIBRATING FOOT on Jackson machine solidly compacts shoulder subgrade.

You won't see

THESE NEW, LARGER "PAYLOADER" TRACTOR-SHOVELS AT THE 1957 ROAD SHOW

...but you may see one of the pilot models which has been under test and development since 1952. Before these new "PAYLOADER" tractor-shovels are released for production, they will undergo additional exhaustive testing on many applications, in many sections of the country. Then, and only then, will they be placed into production. When they do become available, you will have thoroughly job-proved machines, perfected in every detail, with the most advanced performance features in the entire industry. We can assure you they will be well worth waiting for.

You will see

THE MOST ADVANCED LINE OF "PAYLOADER" TRACTOR-SHOVELS

Since their introduction this past year, the new "PAYLOADER" tractor-shovels have been setting new standards of performance on all types of jobs . . . turning out more yardage — faster and at lower cost per yard.

These new "PAYLOADER" tractor-shovels give you most value per dollar of investment — more advanced engineering features that contribute to higher productive capacity — and greater versatility and utility than any other units, size for size.

Designed into the "PAYLOADER" is more than 35 years of tractor-shovel engineering experience in building more units than all others combined . . . your assurance of a quality product — designed right, built right, sold and serviced right.

FULL OF "MORE-YARDAGE" FEATURES

- Exclusive power-transfer differentials
- No-stop Power-shift transmission
- Planetary final drives
- Hydraulic system load shock absorber
- Powerful 40° bucket breakout action at ground level
- Power steering and braking

THE FRANK G. HOUGH CO.
706 Sunnyside Ave., Libertyville, Ill.
Send full data on 4-wheel-drive "PAYLOADER" tractor-shovels.

- ☐ model HO 2¼ yd. payload; 1¾ yd. struck
- ☐ model HH 1¾ yd. payload; 1½ yd. struck
- ☐ model HU 1½ yd. payload; 1 yd. struck

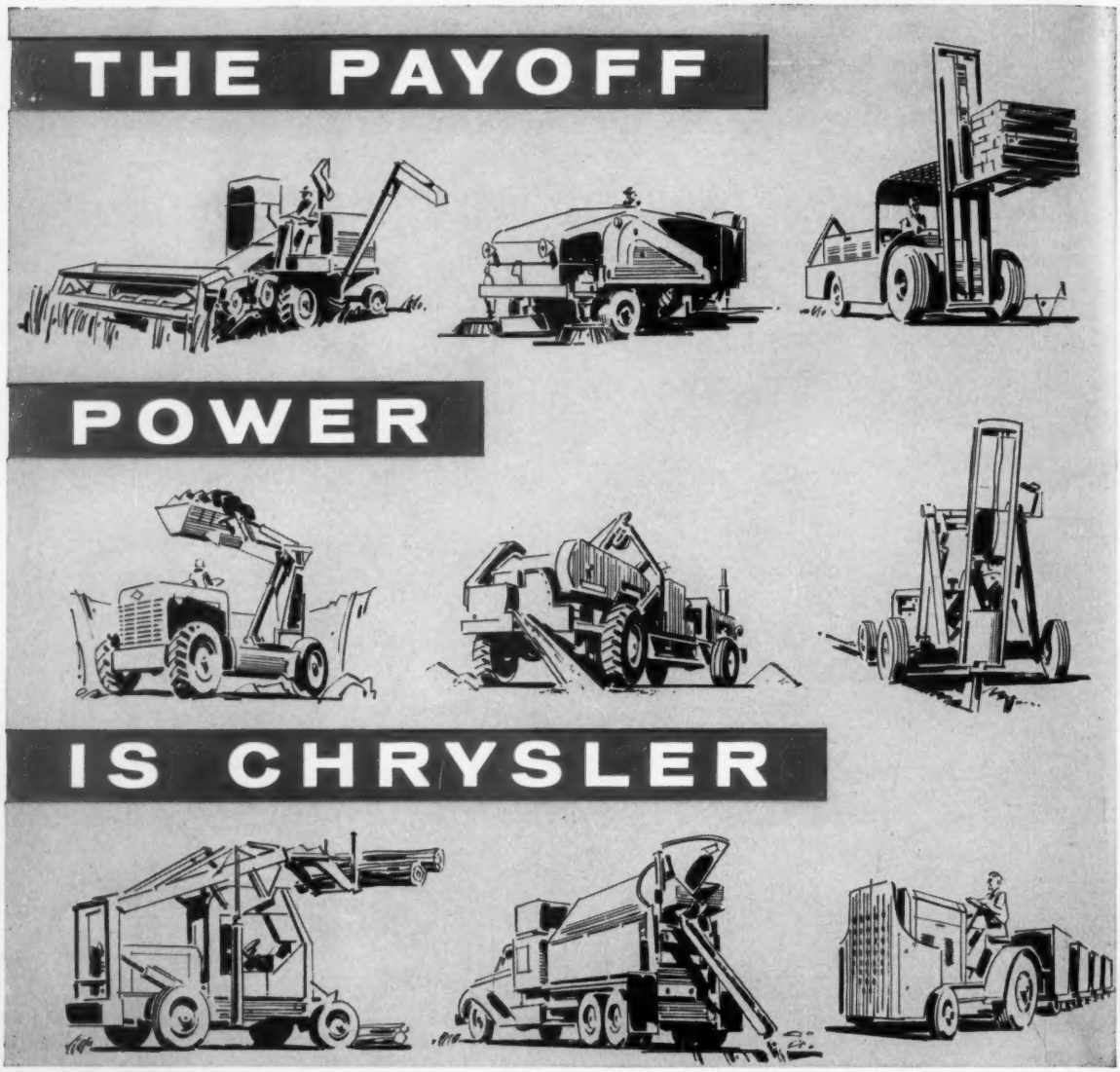
Name _____
Title _____
Company _____
Street _____
City _____
State _____
15 17

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

IH

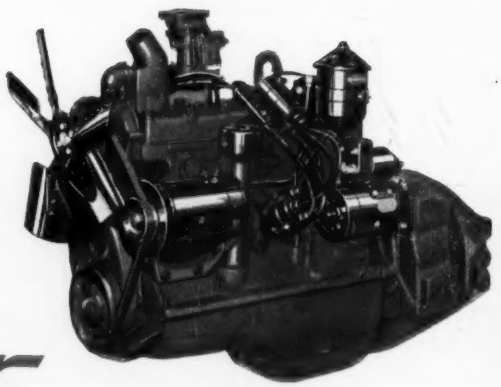
THE PAYOFF POWER IS CHRYSLER



In the oilfields of Texas and Oklahoma . . . in the timber country . . . farmlands . . . industrial areas . . . and on construction jobs large and small. Wherever big shouldered, hard driving power is required – there you'll find Chrysler Industrial Engines at work.

Look around. More and more manufacturers are powering with Chrysler when they build. More and more users are specifying Chrysler Power when they buy. Why? Because both have found that Chrysler produces more payoff power than any other industrial engine built today.

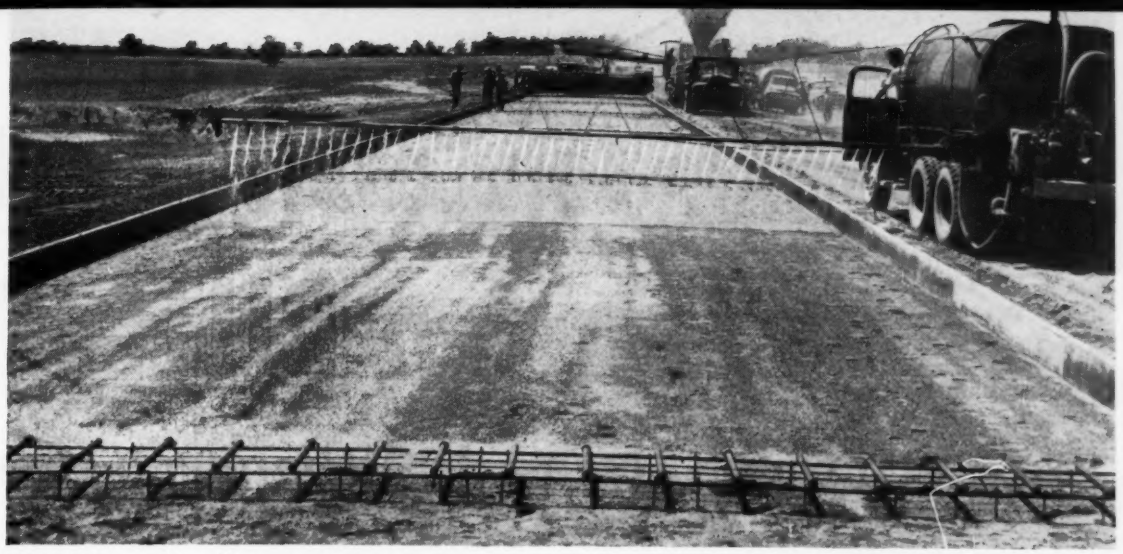
See a Chrysler Industrial Engine Dealer – listed in the yellow pages of your telephone book – or write for detailed information: **Dept. F-1, Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.**



Chrysler

INDUSTRIAL ENGINES

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION



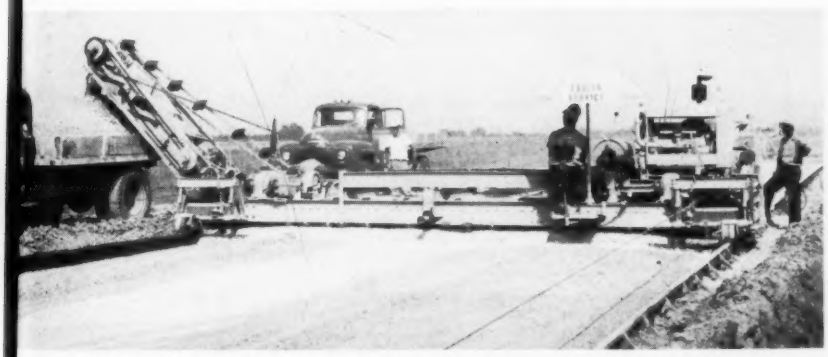
SPRAY BAR rigged by cable to water truck permits this contractor to soak subbase thoroughly in one pass. Simple expedient of running cable from bar's end to truck, supplemented by intermediate suspenders, made this handy spray rig possible.

INGENUITY . . . **continued from page 223**

These Ideas Will Speed Subbase Preparation

Roadbuilders have lots of approved methods for doing this necessary job. But that doesn't stop them from dreaming up innovations that will do the job faster and cheaper. These are some examples.

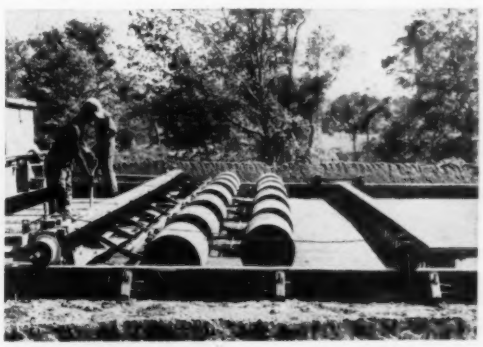
Continued on page 230



EXTENDED CONVEYOR fitted to subgrader loads material being removed from base directly into waiting dump trucks. This eliminates the usual step of first depositing material into windrows then later loading it into trucks for final removal from job site.

STEEL ROLLS were removed from this Galion roller and rubber tires substituted. Result—a neat, rubber-tire compactor.

TRACTORS PUSH instead of pull sheepsfoot rollers. This prevents tractor tracks from causing subbase material to bridge over.



LAWN ROLLERS and scratch template attached to the rear of a mechanical subgrader make the final compaction and simultaneously check subgrade elevation. Rig shown here was dreamed up by an enterprising contractor doing a portion of Indiana Turnpike.

For fast, low cost liquid new design BUTLER

NEW payload power...NEW handling ease

Here's the asphalt transport that gives important saving in time and money to operators of asphalt plants and road contractors alike! A new lightweight design by Butler, manufacturer of a complete line of high capacity liquid transports, makes this asphalt transport 3000 lbs. lighter than most units only three years old! This means *hundreds more gallons* legal payload per haul, fewer trips to the refinery and field, fewer miles to drive to make deliveries, less investment in extra rigs. And, with direct control of your asphalt transportation, you can be sure of dependable, on-time deliveries exactly when you need them.

Butler's new asphalt transport is especially constructed to withstand and maintain the 400°F. temperature at which most liquid asphalt is delivered. The tank is covered with two inches of glass fiber insulation and then sheathed with a steel or aluminum jacket. The use of aluminum—an optional feature with Butler—saves over 800 lbs. and adds that much more to your payload.

For easy cleaning and maintenance, the tank is a single compartment. Drivers say the transport is easy to handle and, because of its round shape, has good visibility to the rear.

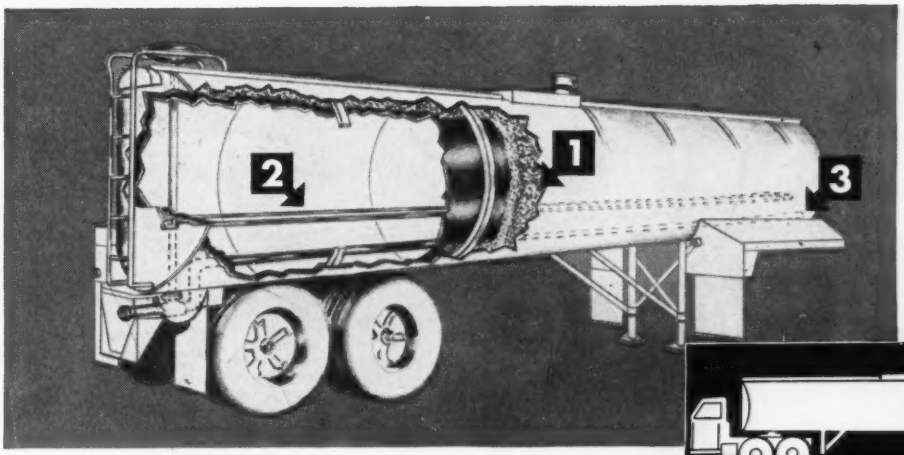
Send for all of the important details of this new development in asphalt transports. Mail the coupon at right.

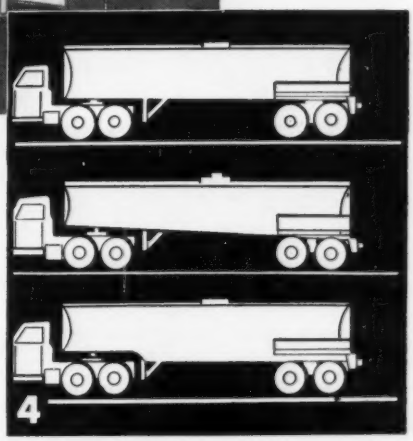
New design 6075 gallon Butler Asphalt Transport for use in Illinois. Butler has made asphalt transports as large as 6500 gallons for areas with high gross weight limits.

asphalt deliveries...

ASPHALT TRANSPORTS

...NEW low-maintenance construction





Optional Features to Fit
Butler Asphalt Transports to Your Operations

1. Steel or high payload aluminum jackets
2. Fire tubes or steam coils inside tank to maintain asphalt temperature on long hauls
3. Pipe through tank to front for tractor-mounted pumps
4. Cylindrical, conical or drop section shape

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BUTLER MANUFACTURING COMPANY

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929 Sixth Avenue, S.E., Minneapolis 14, Minnesota
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1057 Avenue W, Ensley, Birmingham 8, Alabama
Dept. 46, 624 South Michigan Ave., Chicago 5, Illinois

Please send full details of new high payload Butler Asphalt Transport to:

Name_____

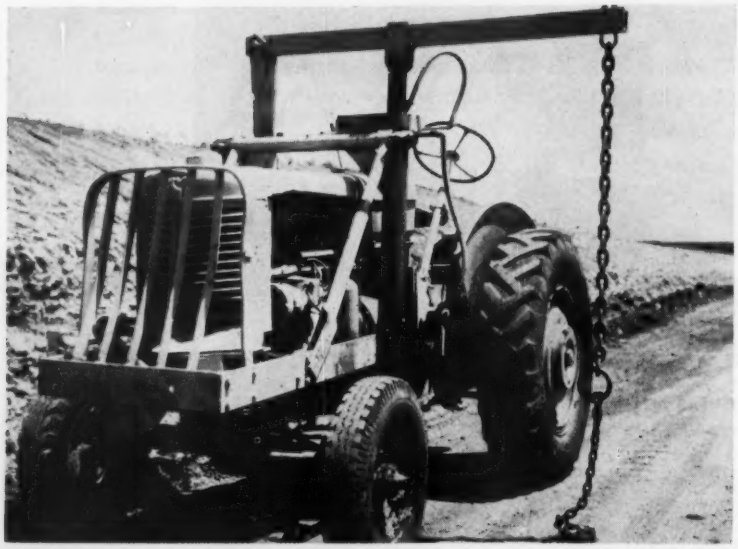
Company_____

Street_____

City_____ Zone____ State_____

Form Gadgets Save Time

Two of roadbuilding's nuisance chores are the placing and stripping of paving forms. Here are several ways contractors make these tasks easier.



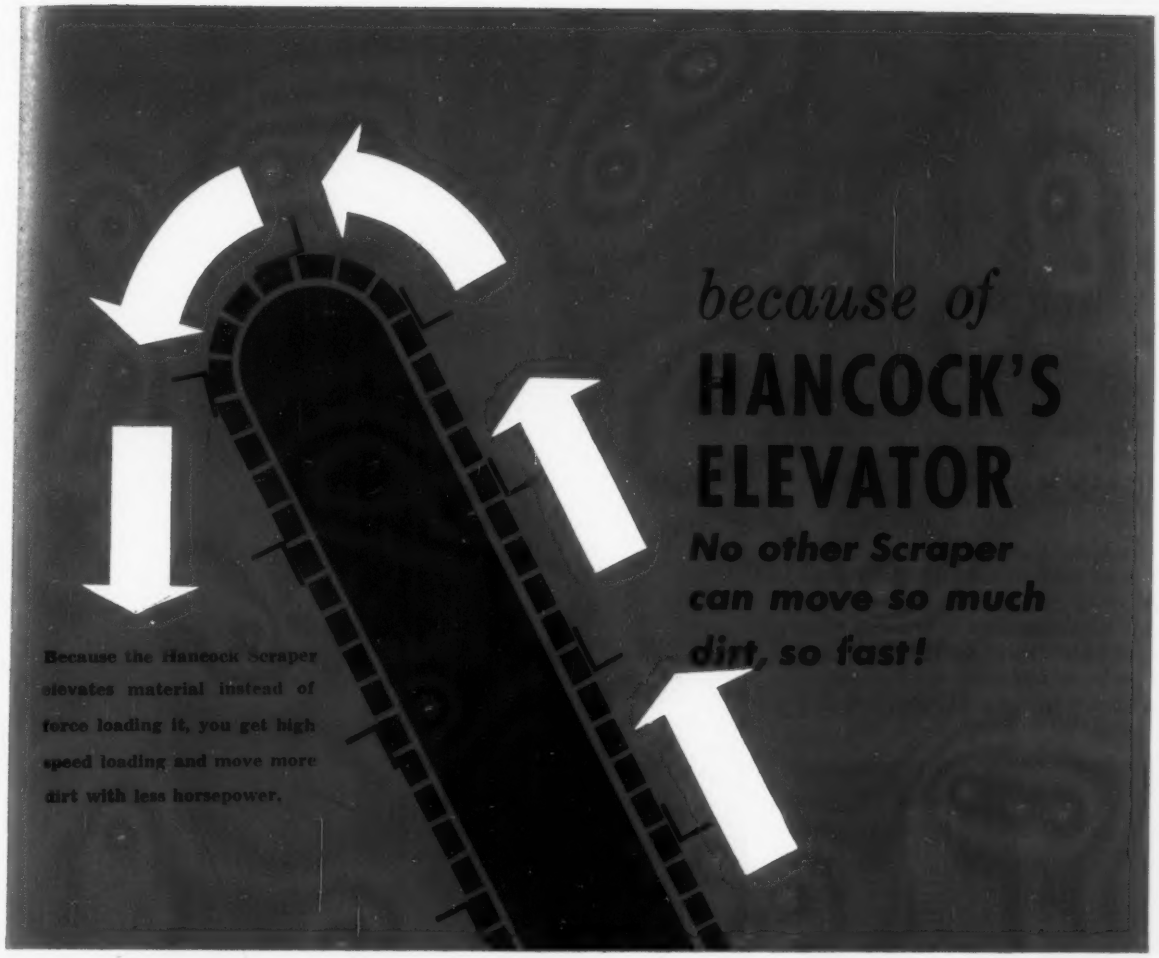
These Are Pin-Pullers

Pneumatic pin puller (above) can be operated by one man and rolls easily over forms and slab surface. Though light in weight it manages to keep form held down while pin is being pulled. Reason? Upward pneumatic thrust of piston causes reverse thrust of cylinder which, attached to frame, pushes form down.

◀ Hydraulic lift (left) mounted on a tractor also is an effective pin puller. This rig, dreamed up by a Kansas contractor, works fine. The tractor is highly maneuverable and can ride over either pavement or shoulders to do its job.

These Are Form Tools

Form setting and aligning tools save wear and tear on other tools not specifically designed for this purpose. Here aligning tool straightens form while workman checks alignment and directs operations. Saving in time to do job is considerable.


because of
HANCOCK'S
ELEVATOR
No other Scraper
can move so much
dirt, so fast!
Because the Hancock Scraper elevates material instead of force loading it, you get high speed loading and move more dirt with less horsepower.

The Hancock Elevating Scraper has the features to give you lowest-cost-per-yard of earth moved. With the elevator continually removing the dirt from around the cutting blade and distributing it evenly throughout the scraper, you get a balanced load at all times. The Hancock 11 Yard Elevating Scraper is hydraulically controlled, works efficiently with any troctor of 60 horsepower or over, and turns in only 28 feet.

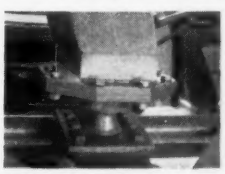
HANCOCK MANUFACTURING CO

PO3-8297 Lubbock, Texas

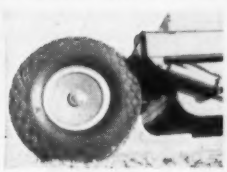
Patents Pending

HANCOCK

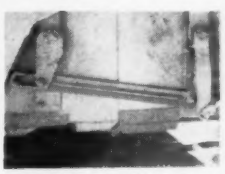
These HANCOCK features mean lowest cost per yard of earth moved.



FIFTH WHEEL — Extreme flexibility and simple adjustment result from ball joint type fifth-wheel.



WHEELS — Scraper has heavy-duty wheels, standard industrial tires and standard wheel bearings.



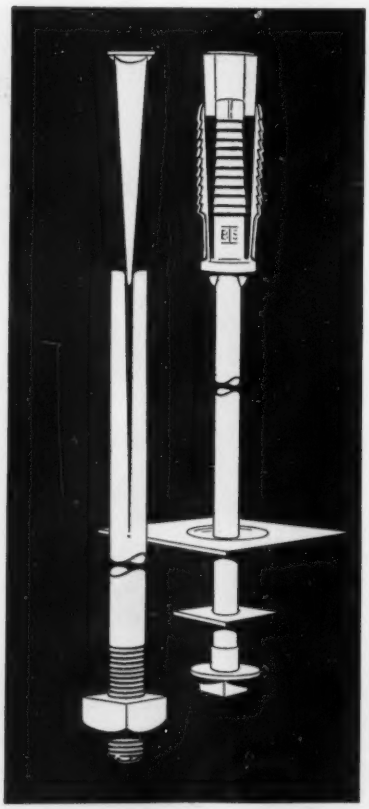
SPREADING UNIT—Delayed dumping of the front bucket permits controlled release and spreading of dirt.

GEARBOX and ELEVATOR —Heavy duty elevator frame is combined with a strong, rugged, trouble-free gear box.

REAR AXLE — Simple but rugged rear axle construction provides for easy alignment to assure level cut.

Two Types of Anchor Bolts for Preventing Rock Slides

If you are planning to combat dangerous rock conditions along highways by means of anchor bolting, you'll be interested in knowing that Bethlehem rock anchor bolts are now being furnished in two types—a headed bolt and a slotted bolt.



Bethlehem slotted anchor bolts are used for close control of roof in the 4500-ft-long tunnel on the Northeast Extension of Pennsylvania Turnpike.

HEADED BOLT

The Bethlehem square-head anchor bolt is ¾ in. in diameter. It has rolled threads, and is used with a malleable-iron expansion shell. When the bolt is inserted in the hole and tightened, the tapered steel plug expands the four leaves of the shell, enabling them to take a good bite against the sides of the hole.

SLOTTED BOLT

Bethlehem's 1-in.-diam anchor bolt is used with a steel wedge, which is started in the forged slot before the bolt is placed in the hole. The opposite end of the bolt has 5 in. of rolled threads. When the bolt is driven against back of hole, the wedge is forced deep into the slot. This expands the bolt ends, exerting tremendous pressure against the sides of the hole.

ACCESSORIES, TOO

Bethlehem also makes a full line of anchor bolt accessories, including flat washers, angle washers, anchor ties, and bolt extensions—in fact, everything you need for a permanent job.

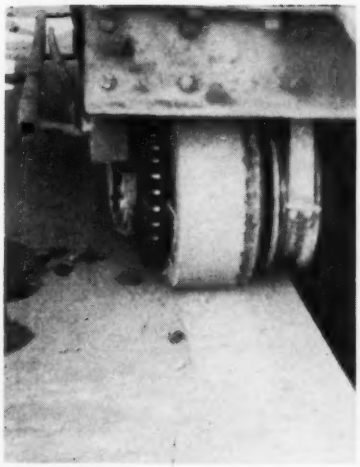
For full information about rock anchor bolting and recommended installation procedures, drop a line to the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



REDUCING diameter of steel-flanged wheels on paving rigs eliminates the need for changing wheels when rigs move from form to slab.

TIE-BAR INSTALLER is made by rigging three notched steel wheels to a steel frame bolted to the back of a spreader. As wheels turn, bars fitted into notches are pressed into concrete to required grade.

TWO VIBRATORS mounted at each end of a spreader can be raised and lowered by the spreader operator. A steel rod connects the vibrators while a second, welded to the connecting one, runs to operator's seat.

INGENUITY . . . continued from page 230

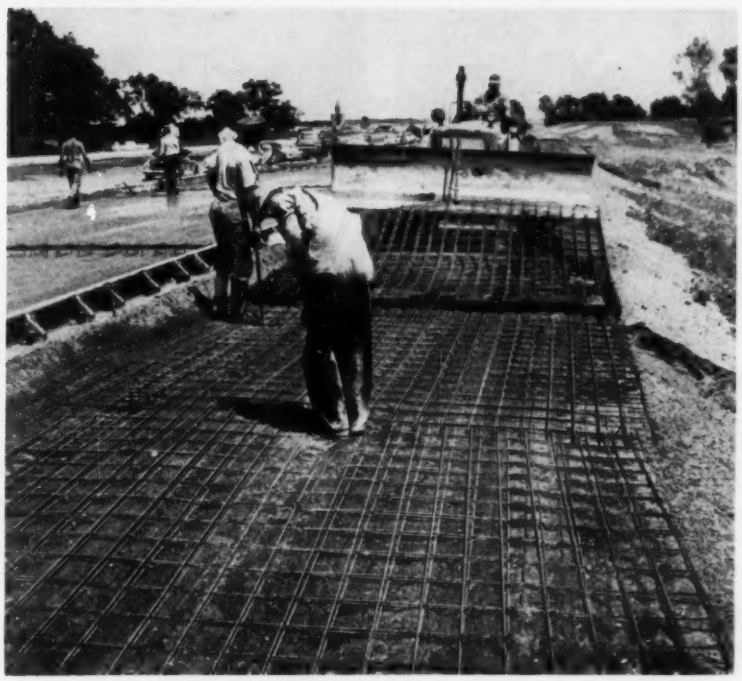
How To Improve Concrete Handling

Of all the phases in the road contractor's art, money really can be saved in mixing and placing concrete if ways can be found to do them faster. Take your pick of these ideas.

Continued on page 234

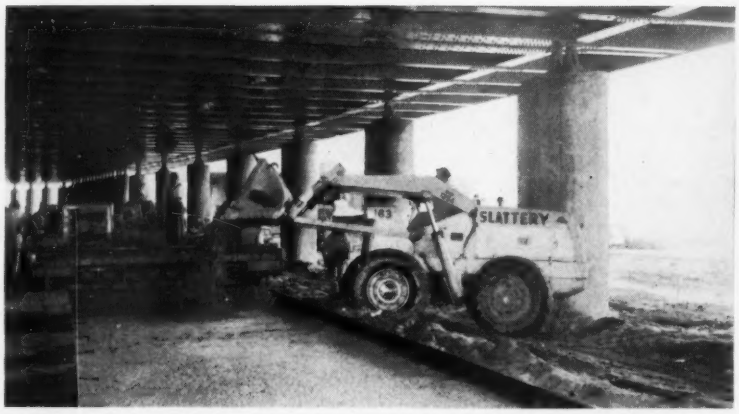
Tractor Moves Steel Mats

This tractor dozer deposits reinforcing mats alongside their eventual location. It simply drags a large pile of mats backwards releasing one after the other as it moves. Mats are easily slipped from chains. They later can be lifted and placed into position on the pavement subbase.



Stationary Transit-Mix ▲

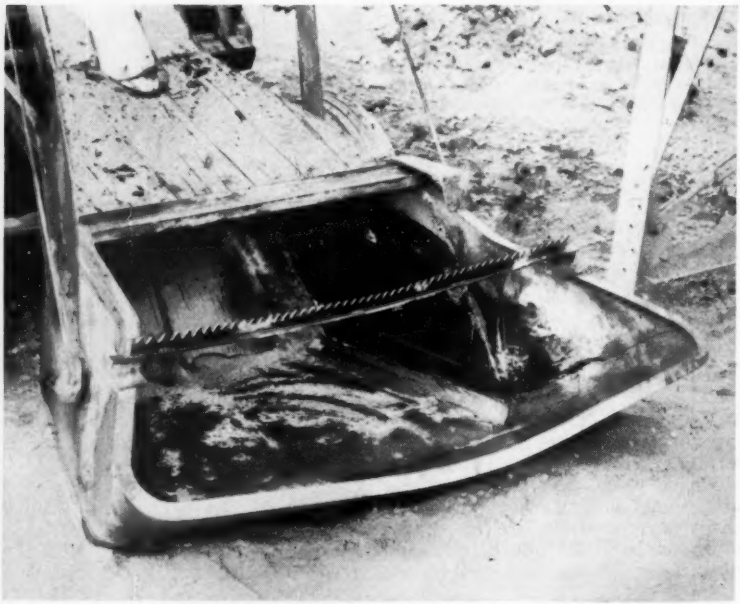
There shouldn't be anything too unusual about using transit-mix trucks to mix concrete but you seldom see them worked like stationary batch plants. Pressed to start a job shortly after closing a contract, this contractor batched and mixed in transit trucks. They unloaded into Dumpcrete-mounting trucks that transported concrete to the paving spread.



TRACTOR SHOVEL easily doubled as concrete buggy when viaduct overhead was too low and prevented pavers from working. This versatile Michigan shovel saved the day.

INGENUITY . . .
continued

TIE-BARS easily can be impressed in concrete by workman standing on bracket behind spreader. Marked stick shows spacing.



SAW TOOTH bar bolted across mouth of concrete mixer skip proves a neat time saver. Workmen can slam cement bags over the bar causing the bags to split in two during batching. Bags are removed.

continued on page 237

Louis B. Sacco, maintenance foreman, J. Henry Harris, contractor, Berkeley, California

"T5X makes my job easier"

"My job of maintaining 250 pieces of construction equipment is made easier by using T5X Motor Oil in all engines, gas and diesel.

"Take this Mack with the NH200 Cummins—we just finished tearing it down after 150,000 miles. It was so clean and showed so little wear that we had it back on the job in record time. There wasn't a bit of sludge in the pan and the liners showed so little wear that we didn't touch them or even replace the rings. The only replacements were new rod bearings, a precaution taken while the engine was down.

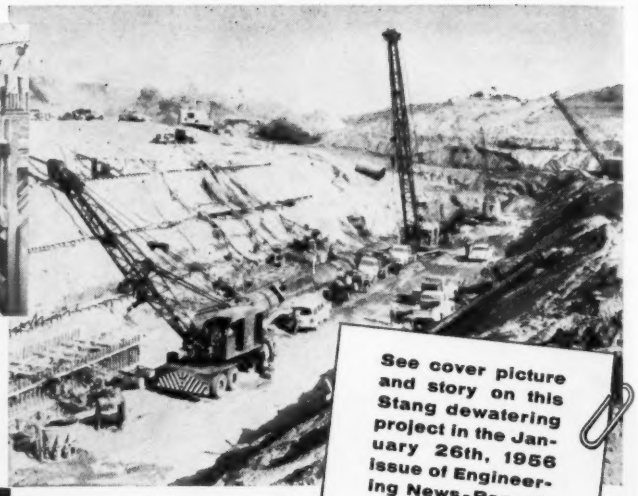
"This is no record with us, however. We have another Mack with many more miles on it than this which hasn't had the head or pan off in more than 5 years, and it's still going strong."

What Mr. Sacco says is true. T5X Motor Oil can make motor maintenance easier and certainly less costly—from the standpoint of labor, parts and downtime. If you're not yet using the *amazing* purple motor oil, we suggest you place your next order for oil with your nearby Union Oil representative. Ask for T5X.

UNION OIL COMPANY 76
OF CALIFORNIA

Los Angeles: *Union Oil Bldg.* • **New York:** *45 Rockefeller Plaza* • **Chicago:** *1612 Bankers Bldg.* • **Philadelphia:** *Eastwick Ave. & Edgewood St.*
Dallas: *313 Fidelity Union Life Bldg.* • **Kansas City, Mo.:** *612 47th St.* • **New Orleans:** *644 Nat'l Bank of Commerce Bldg.* • **Boston:** *214 Harvard Ave.*

This time and money-saving use of Stang wellpoints on a pipeline crossing of the Santa Ana River in California, for contractor Ukropina, Polich, & Kral, provided the ideal solution to an exceptionally tough water handling problem.



See cover picture and story on this Stang dewatering project in the January 26th, 1956 issue of Engineering News-Record.

Only STANG

OFFERS EVERY TYPE OF DEWATERING EQUIPMENT *—ANYWHERE, ANYTIME!*

Turbine—Jetting—Wellpoint—Pumps and Systems. Stang's Nationwide Depots stand ready to "bail you out" on a moment's notice

STANG offers the best equipped, most comprehensive dewatering service in the industry. *Any* type of equipment necessary for the dewatering of *any* type job is immediately available in *any* part of the country.

This *tailor-made* service is available as a complete engineering package, handling every detail from start to finish. It is also available on an equipment rental or outright sale basis. Either way, you are assured of the *absolute tops* in water handling. On your next job where a water problem is encountered, *call in a Stang representative*. You'll be amazed at how quickly, efficiently and economically a no-obligation analysis and recommendation is arrived at.

Stang won a race against the Rio Grande River for contractor D. D. Skousen and Son, of Albuquerque, New Mexico, with this deep well turbine installation on the Rio Grande at the Atrisco Syphon jobsite in Albuquerque. With sub-grade 38′ below the ground water table, 10 pumps provided 800′ of dry sub-grade in a few weeks!

WRITE FOR BULLETIN 100B,

Putting water in its place

STANG

...anyplace!

562

JOHN W. STANG CORPORATION

Engineers and Manufacturers of Dewatering Equipment, Wellpoint and Pumping Systems
Dewatering Planning—Equipment—Service

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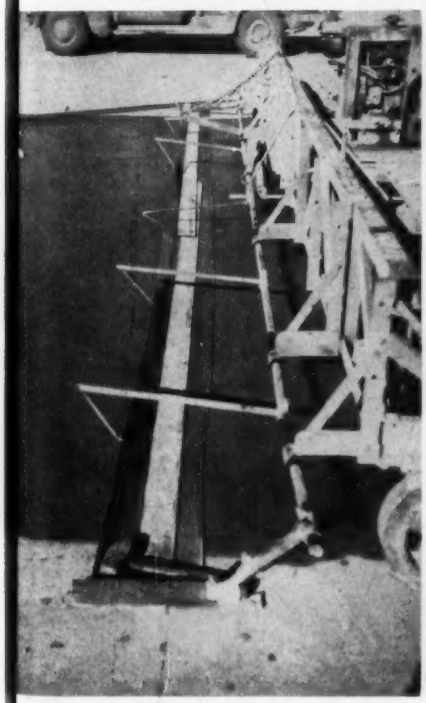
Finishing Tricks Speed Paving

Here's a quartet of slab finishing ideas that were simple in concept and cheap to build. But they proved valuable for the contractors who devised them.

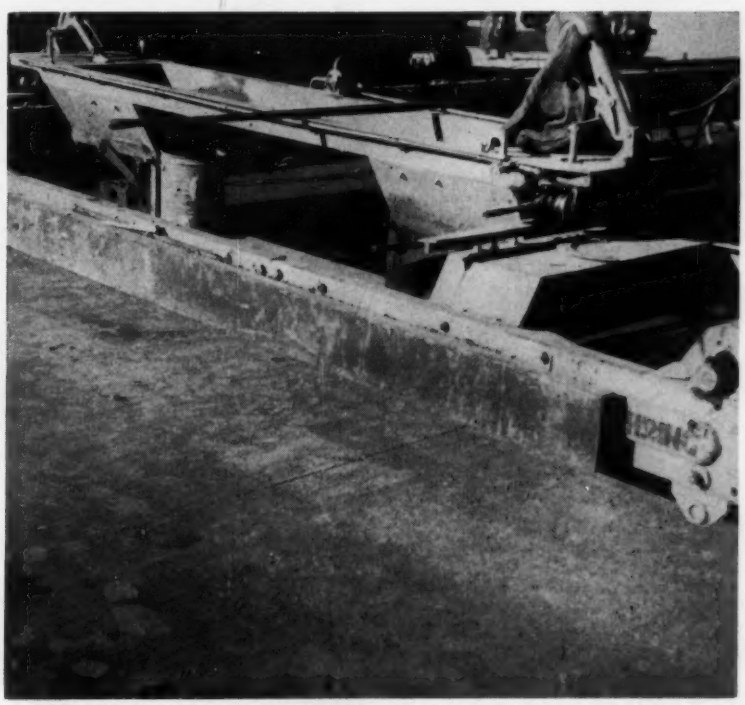
Continued on page 238

ALUMINUM finishing bridges ride on rails where curb and mall reinforcing interferes.

WOODEN BOW improves belting operations on this paving spread. Canvas used for belting is mounted on the light bow that tends to keep belt taut at all times during finishing.



METAL STRIPS set on top of mechanical belt help obtain gritty surface texture.



STEEL SECTION welded to side of this longitudinal float gives positive and easily accessible check on the trueness of straightedges used in slab finishing operations.

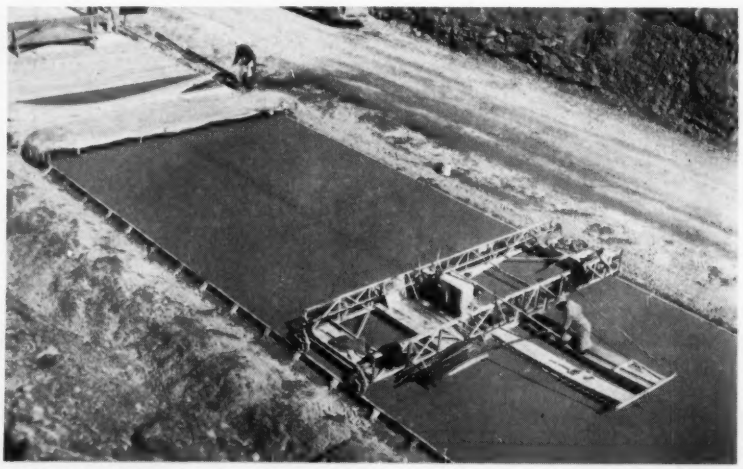
Make Joints The Easy Way

Even slab joints fail to escape the roadbuilding contractor's persistent search for better and faster ways of doing the job. These contractor-developed ideas help save time and money on joints.

PAINTING SURFACE adjacent to joints with whitewash will make removal of excess joint filler easy. Whitewash prevents sealer from bonding to the concrete slab surface.

ADDING WHEELS to this joint seal applicator makes it easier for the operator to handle, thus insuring smoother, cleaner results. Wheel bracket serves as fulcrum.

POWER SAW fitted with worn blade can be used to remove hardened slurry from joints quickly and cleanly on those occasions when slurry is used for curing joints.



CURING MACHINE can be modified into a joint-making rig by adding of planks. Workman kneels on planks suspended by rods from top of Heltzel rig. He pulls metal strip out of concrete and places it on nearby shelf. Reaching down between planks, he finishes joint with edging tool and moves ahead to next strip. Extended arm control moves rig ahead.

BRUSH HOOK proves itself a useful tool for cleaning out stones and other large material from sawed joints prior to their sealing.

STRING LINE run between forms and snapped into fresh concrete is an old cement mason's trick. But it is an accurate way of squaring joint lines and insures a true saw cut. Curing paper alongside forms will be placed over snap-line imprint for protection.

THE CASE OF
THE DANGEROUS DRUMS

THANKS FOR DROPPING BY, ART. THINK I NEED A SET OF NEW INJECTION VALVES.

HMMM, YOUR TRACTOR'S NOT VERY OLD. SHOULDN'T NEED VALVES.

SURE ACTS LIKE IT. THE ENGINE IS MISSING AND LOSING POWER!

BET YOUR TROUBLE'S RIGHT HERE, FRED ----LOOK AT THE WATER IN YOUR FUEL!

FRED, YOU NEED BETTER FUEL STORAGE FACILITIES. WATER AND RUST ACCUMULATE IN THESE DRUMS AND THERE'S NO EASY WAY TO DRAIN IT AWAY. JUST IN CASE THOSE VALVES ARE STICKY, I'LL BE GLAD TO CLEAN AND TEST THEM.

WE CLEANED THE VALVES, FRED. THEY CHECKED O.K. AND ARE READY TO GO.

THANKS, ART. YOU SAVED ME MONEY. BY THE WAY, I ORDERED A NEW FUEL STORAGE TANK TODAY!

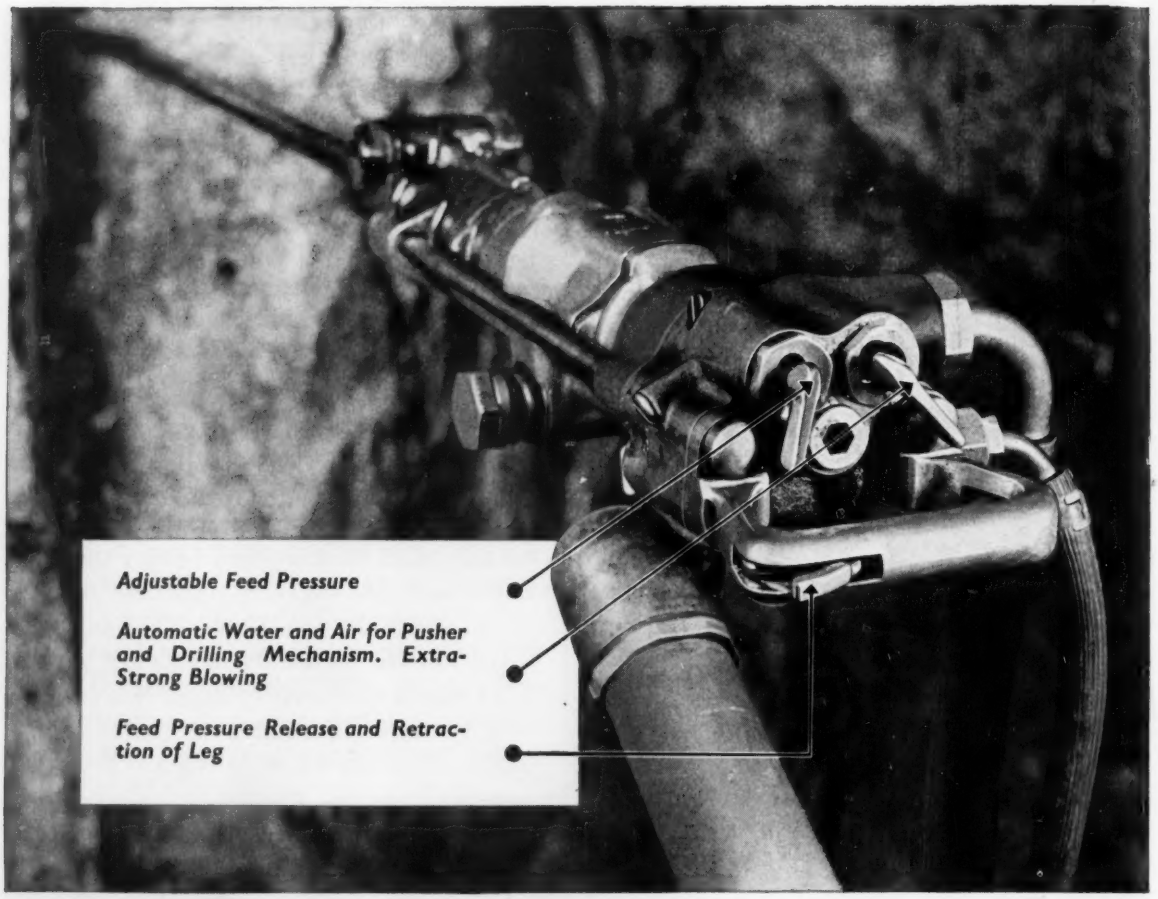
CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co

CAT CARE FOR LONGER WEAR

LET ME HELP KEEP YOUR CAT* EQUIPMENT ON THE JOB!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.


Adjustable Feed Pressure
Automatic Water and Air for Pusher and Drilling Mechanism. Extra-Strong Blowing
Feed Pressure Release and Retraction of Leg

RETRACTABLE LEG AND ONE-HAND GRIP-CONTROLS SPEED DRILLING TIME

For years Atlas Copco have been the world's largest manufacturers of pusher leg drills. Since 1937 when Atlas Copco, far ahead of any other manufacturer, introduced their first pusher leg drills, they have continuously improved the design of these drills. Their latest development, the Atlas Copco 'Lion', combines an unequalled ease of operation together with a high drilling rate—both contributing to a higher footage per manshift.

All controls under one hand

The Atlas Copco Lion is the first drill to have all the valves which operate the drill under the control of one hand. *Full control without having to move the hand from the backhead!*

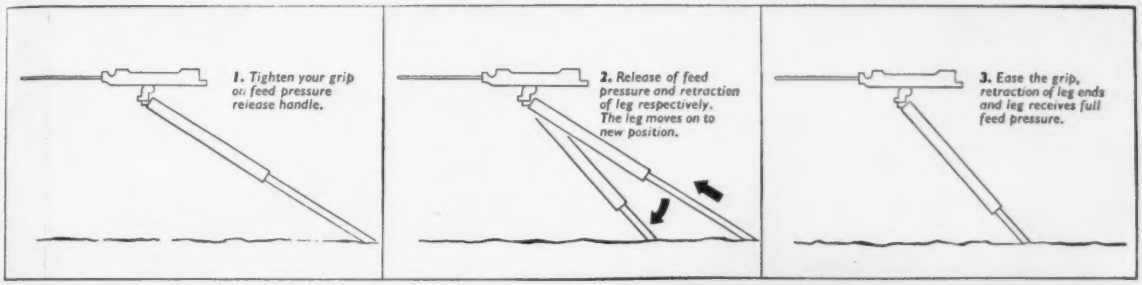
The valves are all easy to operate. By the use of only the fingertips the drill can be started or shut off, the feed can be adjusted to the pressure required, or retracted for an advance, and the extra air-blowing can be brought on to clean the holes.

All the control handles have been designed in such a way that they are well protected. While using them the operator's hand is never near the wall or roof of the drift. The Lion is the first pusher leg drill with controls placed for drifting.

Retractable leg saves time

When the leg has to be moved the feed pressure is easily released by squeezing the hand grip. By further pressure on the grip the leg retracts automatically.

Pusher leg moves forward with drill in full action


1. Tighten your grip on feed pressure release handle.
2. Release of feed pressure and retraction of leg respectively. The leg moves on to new position.
3. Ease the grip, retraction of leg ends and leg receives full feed pressure.

When the leg is in the new position suitable for continuous drilling, retraction stops and the feed pressure comes back by loosening the grip of the hand. *All this can be done while the drill is still running.*

This new idea of a retractable leg enables quicker repositioning of the leg and reduces the number of steel changes, thereby increasing footage per manshift. When drilling high holes it is now far easier to alter the position of the leg more frequently in order to maintain an optimal feed angle and feed pressure.

Packed with power for deep holes

The Lion has a drilling rate at least 30% higher than other rock drills of the same weight. Furthermore, it is designed so that it can maintain its high speed *even when drilling deep holes.* This means quickly drilled deep hole rounds and a faster, steadier advance. You'll also find that the Lion reduces *to a minimum* the gauge wear of the bits in abrasive rock. And owing to the ease with which the feed pressure is released and brought back into action, the Lion is a *handier* drill to work with in fissured rock.

Sandvik Coromant –the right steel for the Lion

All Atlas Copco drills—and this goes for the Lion—have been developed from the earliest stages with Sandvik Coromant tungsten-carbide-tipped integral steels and detachable bits. No drill or steel developed separately could ever give such equivalently high performances as this drilling combination. It is today the most widely used in the world, responsible for drilling more than one billion feet per year.

Free Demonstration! *Wire, 'phone or write* today *to any one of these offices and see the Atlas Copco Lion in action for yourself.*

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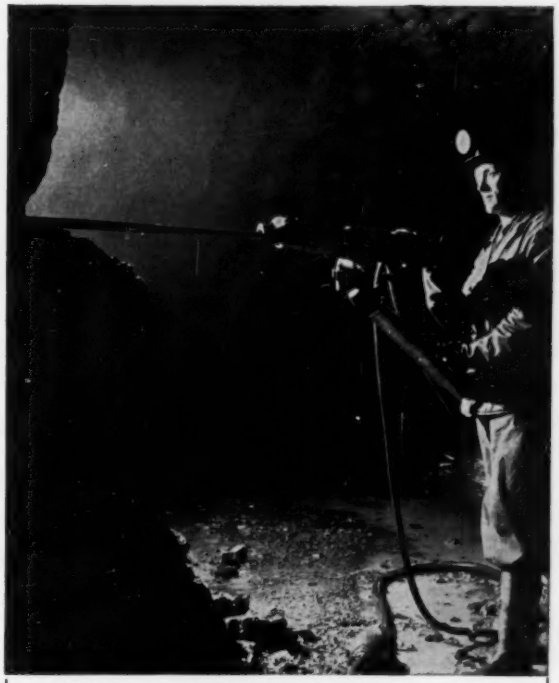
CANADA, Atlas Copco Canada Ltd., Montreal Airport, P.Q.

MEXICO, Atlas Copco Mexicana S.A., Apartado 56, Torreon, Coahuila.

The ATLAS COPCO GROUP puts compressed air to work for the world. It is the largest group of companies specializing solely in the development and manufacture of compressed air equipment. It embraces Atlas Copco companies or agents manufacturing or selling and servicing Atlas Copco equipment in ninety countries throughout the world.



Without changing the grip of the hand the driller can easily position and control the machine, saving time and reducing fatigue.

Atlas Copco

DS51

Manufacturers of Stationary and Portable Compressors, Rock-Drilling Equipment, Loaders, Pneumatic Tools and Paint-Spraying Equipment

You can depend on BLAW-KNOX PAVING EQUIPMENT EXPERIENCE for the BIG JOBS AHEAD

BLAW-KNOX PAVING EQUIPMENT
proved on Turnpikes and Superhighways across the Country

On Turnpikes and on Superhighways all across the country Blaw-Knox Concrete and Bituminous Paving equipment units have proved they have what it takes to produce big capacities to rigid specifications under tight working schedules. Among the major highway projects where Blaw-Knox equipment has been proved are: Pennsylvania Turnpike, New Jersey Turnpike, New York Thruway, Virginia Turnpike, Ohio Turnpike, Indiana Turnpike, Massachusetts Turnpike, Kansas Turnpike and the Florida Turnpike. This same equipment has proved equally successful on smaller paving projects.

In the Blaw-Knox "Complete Package" you get the most efficient concrete paving outfit available, because every piece of equipment is built by one responsible, experienced manufacturer, with each unit engineered to match the others in size, capacity and performance. Road Forms carry the Precision Subgrader, Transverse Blade Spreader and Finisher. Automatic Batching plants will keep two of the new hydraulic MultiFoote Pavers working at peak capacity.

On Bituminous Paving projects you can have the same efficient low cost production. This Blaw-Knox equipment assures you the biggest capacities for spreading the sub base material, laying the pavement mat, to finishing the shoulders. Blaw-Knox Base Pavers will spread up to 400 tons per hour of base material *without segregation*. The new Model PF-90, described on the opposite page, can handle up to 200 tons per hour of bituminous paving. The Blaw-Knox Road Widener will assure fast work of shoulder building without wasting material.

When you have a Blaw-Knox paving outfit for either bituminous or concrete paving you get preventive maintenance since all your equipment belongs to one family. It's standard practice for your Blaw-Knox trained service man to check each unit on each service call, to stop trouble before it starts.

You can get the complete story on Blaw-Knox paving equipment from your nearest Blaw-Knox distributor. Many of these high capacity units will be at the 1957 A.R.B.A. Road Show.

BLAW-KNOX PAVING EQUIPMENT

Road and Airport Forms • Manual or Automatic Cement and Aggregate Bins and Batchers • Precision Subgrader • MultiFoote Concrete Paver • Concrete Spreader (with or without Vibratory Attachment) • Concrete Finisher (with or without Vibratory Attachment) • Base Pavers • Bituminous Paver Finisher • Road Widener • Trench Roller • Street and Gutter Forms • Concrete Buckets

Blaw-Knox 1957 Model PF-90 is even Better!

The Blaw-Knox Model PF-90 Bituminous Paver Finisher now has engineering advances that provide higher paving speeds and greater paving width. A wider range of paving speeds is provided with a new two-speed axle that gives a low working speed of 10 feet per minute to a high paving speed of 52 feet per minute. The PF-90 also has a higher travel speed of 7.4 miles per hour to give you greater mobility on between paving moves.

Another important feature of the new Model PF-90 Paver is the increased paving width. It can now lay a bituminous mat 16 feet wide, three feet wider than the previous maximum width of 13 feet. This new paving width has been tested and proved on many types of operation including the Massachusetts Turnpike.

Other important features of the Model PF-90 include the rubber tire mounting which eliminates from 600 to 700 wear parts typical of crawler mounted pavers. The PF-90 also has a big 10-ton hopper so it can take a full truck load without spillage. You can see these features and many more at the Road Show.

BUILD BETTER ROADS TODAY · FOR A GREATER AMERICA ·

See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957

AMERICAN ROAD BUILDERS ASSOCIATION

Blaw-Knox will show the latest and best at the 1957 Road Show

The Blaw-Knox exhibit at the A. R. B. A. Road Show, from Jan. 28 through Feb. 2, 1957 will show important equipment that you will want to plan on using in your future paving jobs. Some of the equipment shown will include: New Bituminous Paving Equipment, an Improved HiBoy TRUKMIXER, Improved Automatic Batching Equipment, the Time-tested Concrete Spreader, a Base Paver, Road Widener and a Trench Roller.

The Blaw-Knox Exhibit is located at Booth 727 in the Exhibition Hall at the International Amphitheatre

BLAW-KNOX COMPANY

BLAW-KNOX

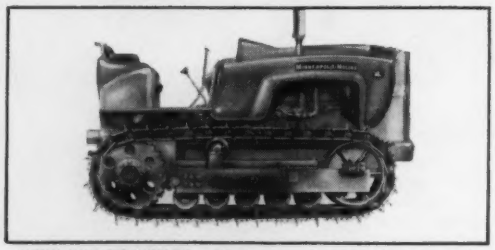
CONSTRUCTION EQUIPMENT DIVISION

38 Charleston Ave., Mattoon, Illinois

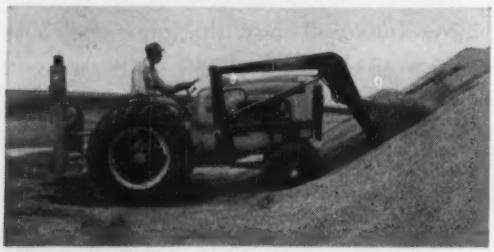
Never before so *many* ways to beat job costs!

Every way you work these new POWERlined Minneapolis-Moline Wheelers you're making money. And never before could any industrial tractor work for you in so *many* ways! Here's MM high-torque, high-compression power with big piston displacement and moderate rpm—*real* lugging capacity. And to make that extra power pay you best, these new Wheelers have MM's exclusive Ampli-Torc Drive for 10 speeds forward . . . 2 reverse. You can *double* traction power and drop ground speed 48% . . . under load . . . without shifting or clutching. On PTO jobs, these new MM Wheelers give you power straight from the crankshaft, fully independent of the transmission. MM's integral, rear-mounted hydraulic pumps with capacities up to 35 gallons per minute offer highest hydraulic efficiency at low engine speeds.

MM MINNEAPOLIS-MOLINE **POWERLINED WHEELERS**



NEW 445 CRAWLER—It's the crawler with features only MM could build—all the POWERlined advantages with new crawler traction. Available in gasoline or diesel models.



NEW 335 WHEELER—New performance, new class in this power and price bracket. Packs 47 bhp, big 167 cu. in. engine, wide choice of integrated hydraulic pumps, Ampli-Torc 12-speed drive.

FEATHER-TOUCH HANDLING—

The man who drives your POWERlined Wheeler devotes his attention to doing the *job*. There's no wrestling the wheel, even on the heaviest, muddiest ground; MM's built-in power steering supplies hydraulic muscles to do 90% of the work. One-lever Ampli-Torc Drive control, smooth-acting double-disc brakes, and scientifically located controls help cut jobs times to a brand new low.

CAPACITY THAT CAN TAKE IT—

Your POWERlined Wheeler carries its power on a backbone that can take the heaviest strains of front or rear loads. Heavy cast crankcase, transmission housings, and final drive units are joined by wide flanges to form single-unit rigidity. Heavy-duty industrial front ends and tires take rated capacities right in stride. This recognized MM construction means long trouble-free life under heaviest, continuous-load operation.

PROVE 'EM—ON THE *JOBS* YOU DO!

Find out what these new POWERlined Wheelers can do to speed *your* jobs. Ask your MM Distributor for an on-the-job demonstration, with the mounted equipment you need.

AT THE ROAD SHOW . . .

SEE 445 UTILITY WHEELER—57 Engine bhp.
445 INDUSTRIAL WHEELER—57 Engine bhp.
335 INDUSTRIAL WHEELER—47 Engine bhp.
NEW 445 CRAWLER—57 Engine bhp.

The **GOLDEN POWER LINE**

MINNEAPOLIS-MOLINE

INDUSTRIAL POWER DIVISION • MINNEAPOLIS 1, MINNESOTA

6: Conveyors

By W. A. RUNDQUIST,
Vice President,
Pioneer Engineering Works

IN THE PRODUCTION of aggregates, the most popularly used conveyor is the belt type. Next would be the bucket elevator, and lastly those special conveyors variously designated as "vibrating," "oscillating," "screw," etc., designed primarily for the handling of fine materials.

In the earlier days of aggregate plant operation, the bucket elevator displayed greater prominence than it does today. Then plant sites were more restricted in operating area, labor cost ratios were lower, and quantities produced per hour were less. Because of its greater simplicity of design, lower maintenance cost, higher continuous capacity, and because there is now usually more land available at the plant site, the belt conveyor has become the universally accepted means of moving the material around. Further, it can be extended to reach out and solve many of the stockpiling problems current today. In like manner, a conveyor can be extended as the material source in pit, quarry or slag pile gets farther away from the primary plant.

CONNECTING various plant components, conveyors are vital when processing aggregates.

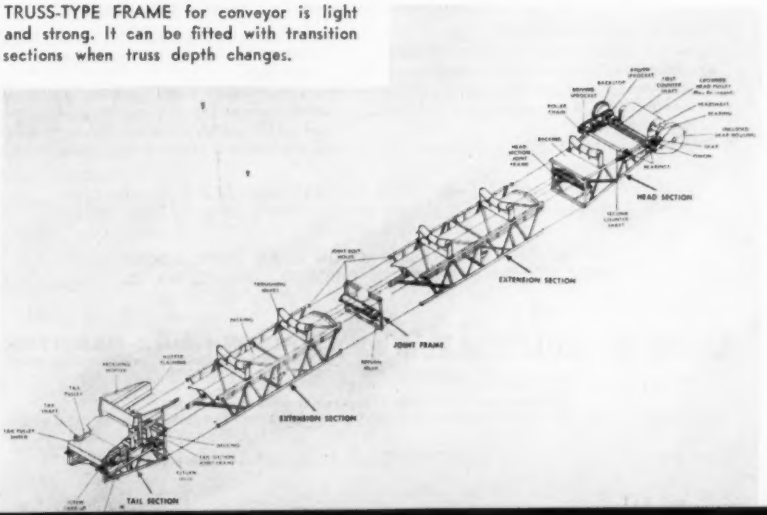
Belt Conveyors

When properly applied and installed, the belt conveyor generally is the most economical means of handling materials. No other is so simply constructed or requires so little attention other than preventive maintenance. The load on any given section of a belt conveyor is seldom great. Yet because of its continuous operation it can move an enormous quantity of material in a given unit of time. By comparison with other operating units in the plant, power requirements are low because the work peaks are leveled out.

Because of the relative simplicity of design of the ordinary conveyor, many manufacturers make them. But the buyer usually gets what he pays for, so should look for quality, dependability, and low cost maintenance in conveyors, just as for other plant components.

One of the factors seldom given enough consideration in selecting a conveyor is the economic effect of belt wear and belt replacement. In

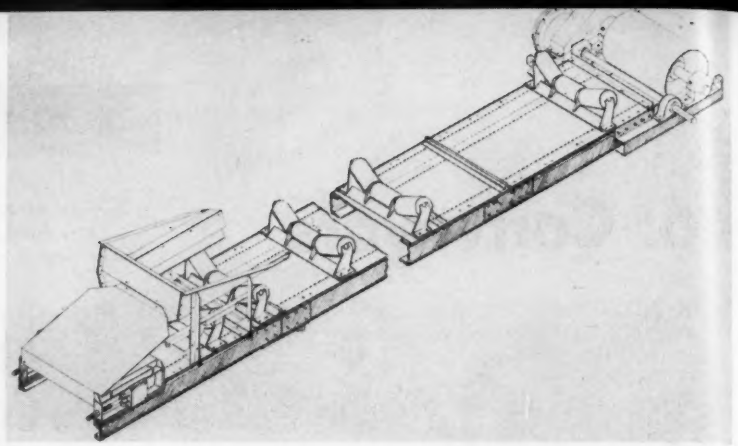
TRUSS-TYPE FRAME for conveyor is light and strong. It can be fitted with transition sections when truss depth changes.



PRODUCING AGGREGATES . . .
continued

a quality belt conveyor, the belt represents from 25 to 35% of the conveyor cost. To assure least possible rubbing and scraping of the belt edges, a good conveyor will be made up of sturdy, rigid sections capable of being assembled straight and true so that it will maintain its alignment with least sag and sway.

While there are a number of types of conveyor frames, most popular are the truss and the channel. The latter is used principally horizontally on the ground and for underground installations. The truss conveyor, because of its relatively light weight and high strength, is the choice for most aggregates producing installations.

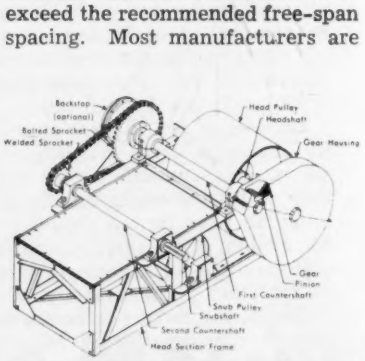


CHANNEL-TYPE FRAME for conveyor is generally used horizontally or underground

Truss Type Frames

The truss type frame is built with side panels having an upper and lower chord angle separated by lighter weight vertical and diagonal members. The two side panels are spaced the correct distance apart by additional cross members, all components arranged in a pattern to offer greatest resistance to bending, twisting and weaving. Additional structural strength is provided by joint frames connected between sections. In effect, then, the conveyor frame becomes a truss-built bridge across which the material is moved as a continuous load, under which the idlers become the wheels on which the belt rides.

Because considerable economics are involved in the design of the conveyor truss, manufacturers impose definite limitations on the allowable free span. Support towers or bents should be located not to exceed the recommended free-span spacing. Most manufacturers are



TERMINAL EQUIPMENT, such as this head end, must be matched with requirements.

The LIMA ROADPACKER
. . . faster high-density compaction at lower cost

The penetrating vibration of six heavy vibrating shoes compacts macadam bases and gravel sub-bases to specified densities.

Course aggregate for macadam bases up to 12" thick can be spread in a single layer, then uniformly compacted to final density over a 13'1" width with the LIMA Roadpacker.

Single spread, which is permissible only with the vibratory method, reduces material handling by one-half or more—it eliminates backtracking of spreading equipment and contour shaping is needed only once.

The action of the vibration "runs in" screenings to full depth of macadam with only three operations. Much of the labor formerly required to spread, broom and roll is eliminated.

The versatile LIMA Roadpacker performs with equal efficiency on both full-width and widening jobs.

Here's how the LIMA Roadpacker speeds up paving operations.

- **Drives to job at 30 MPH.**
- **Compacts equally well traveling forward or reverse—no deadheading or turning around when two passes are required.**
- **Covers a 13-ft., 1-in. width, one half of a two lane road.**
- **Operator can easily fold end shoes for narrower working widths or for highway travel. Shoes are raised and lowered hydraulically.**
- **Low maintenance—all working parts are completely enclosed, can even operate under water or dirt. Shoes are driven hydraulically and are pressure-lubricated.**

A fact-filled 4-page folder tells how the new LIMA Roadpacker will help you make more paving profits. Write for your copy today.

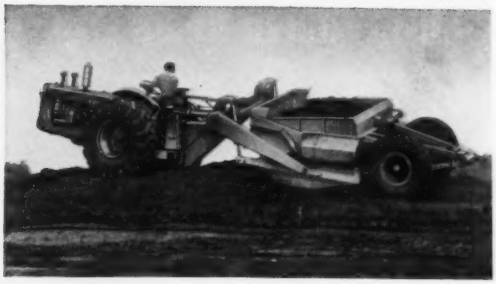
SEE THE LIMA ROADPACKER AT THE ROAD SHOW, BOOTH 702, SECTION D ANNEX IN CHICAGO, JAN. 28-FEB. 2.

LIMA SHOVELS • CRANES DRAGLINES • PULLSHOVELS

BALDWIN-LIMA-HAMILTON Construction Equipment Division — LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation Hamilton • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

AT LAST!



A versatile self-propelled scraper

that brings self-loading savings to everyone!

No matter whether you're a small contractor in need of a *first* self-propelled scraper...or a large contractor needing a *fill-in* rig—this amazingly low-priced Oliver is your first practical answer.

These are the facts: this all-hydraulic scraper is powered for the job, sized for the road and priced so you can have it *now!* It's fast, versatile, maneuverable and able.

Profit from its better self-loading ability in all forms of scraper work in earth, sand—digging, moving, grading, filling, dumping, and spreading.

It's tops for visibility and operating ease with exclusive low-mount hitch and finger-tip hydraulic control. It loads fast and full with special curved bowl design. High sweep apron with positive roll-out ejection gives clean, controlled spreading. It's 100% hydraulic; no cables anywhere!

All this in a more versatile, job-extending self-propelled at an easily afforded price that's actually *thousands* of dollars under other rigs. See your Oliver distributor.

VITAL STATISTICS

Capacity—6.7 cu. yd. heaped
Power—GM industrial 3-cyl., 83 h.p. diesel
Transmission—6-speed selective transmission (torque converter optional)
Steering—Positive hydraulic
Dimensions—19'1" (scraper); 30' scraper and tractor; 8'6¼" width
Tires—14.00 x 20 scraper; 18.00 x 26 tractor
Control—Fully hydraulic

Get yours!

This complete picture and fact bulletin of America's lowest priced self-propelled scraper. Write now!

OLIVER

THE OLIVER CORPORATION
400 W. Madison Street, Chicago 6, Illinois

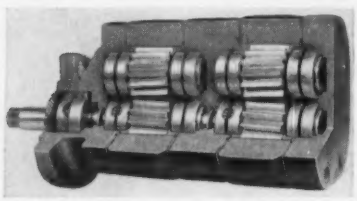
a complete line of industrial wheel and crawler tractors and matched allied equipment

Hydraulic Motors Drive Crawler At Two Speeds

Two "Commercial" oil hydraulic tandem motors propel the crawlers of this Gradall. In fact you might say that there are really four motors as each tandem motor consists of two single motors. Here is how they operate to give the Multi-Purpose Gradall low and high speed ranges.

single or combined output

Two single motors are mounted with one common drive shaft. When fluid power from the pump ource is directed by simple valving into just one of the single motors, the shaft rotates in the high speed range desired for propelling the crawlers where the going is on good level terrain. The other single motor on the same shaft receives no input and therefore idles at motor speed. When conditions are otherwise and low speed is required, it is accomplished by simply valving half of the fluid into each of the single motors. Because the volume feeding into each is less, the speed is reduced. Both tandem motors can be stopped or operated in either direction to give forward or backward travel to the crawlers.



Look at the heavy duty bearings which absorb the shaft and gear loadings. Perfect alignment of the matched helical gears results in more efficient, smoother, quieter and longer life operation.

50 h.p. output

As an example, an "H" Series single shaft tandem motor receiving an input of about 15 gpm at 1200 psi would rotate at 1200 rpm when the entire input was directed to only one of the two single motors When this input is split between both motors, their speed would drop to 600 rpm. The example is based on two single motors mounted in tandem on a common shaft with each motor having gears of 1 inch face. Motors with larger gear widths are available to develop a rated output up to 50 h.p.

important advantages

All of this is accomplished without shifting of gears. Power takeoffs, clutches and gear transmissions are eliminated. Here is another proven application where fluid power is piped around corners. It is successful because space is conserved and high initial cost mechanical drives with their constant maintenance problem are eliminated.Write to Dept. B-1, The Commercial Shearing and Stamping Company, Youngstown, Ohio,

COMMERCIAL
shearing and stamping

PRODUCING AGGREGATES . . .
continued

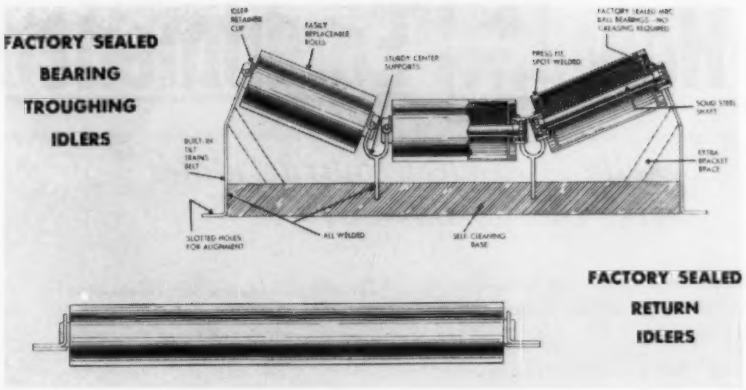
glad to furnish data showing recommended truss depths for the most economical use of fabricated-steel conveyor supports. For example: If a conveyor is to be installed on an incline of 18 deg, it may be most economical to use a 24-in. truss up to a certain point, and to use a 42-in. truss beyond that point because of the saving in total amount of steel through the longer free-span of the deeper truss. Transition sections in the conveyor frame make such change easy.

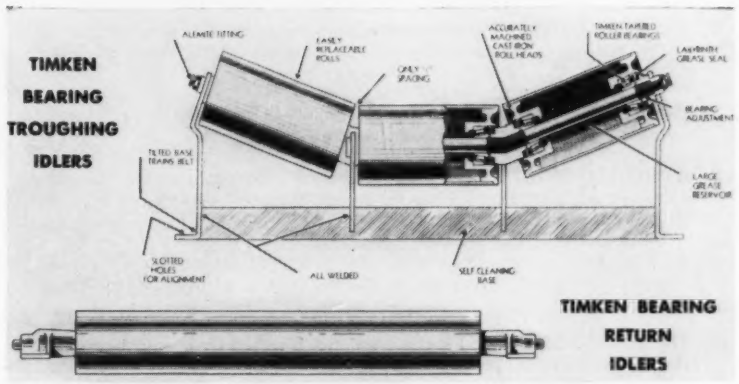
This, of course, is most generally true for conveyors of fairly great length and elevation. However, data on which such calculations can be based vary with each manufacturer, so no universally applicable data can be given.

Channel Frames

Channel frames are merely sections of rolled steel channel, bolted together to form stringers on which the various other parts of the conveyor are mounted. Short legs frequently are attached to the channels to hold them up high enough to permit return idler

Continued on page 252





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Before you buy any truck mixer learn about CMC TED Transcretes first! WRITE FOR NEW, FREE, FULLY ILLUSTRATED FOLDER.

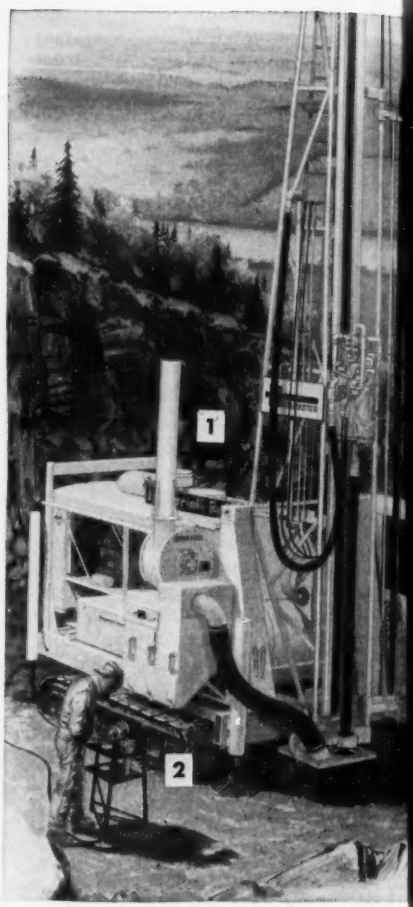
FOR STILL BIGGER SAVINGS—
MORE PROFIT ON EVERY POUR

Use truck engine power without sacrificing performance — save as much as $55 per month per machine on gasoline alone. All the job-tested, time proven BIG VALUE features of other Transcretes — including trouble-free Floating Drive and Swing-Out Hopper. YOUR GUARANTEE OF FASTER CHARGING, MORE THORO MIXING, QUICKER DISCHARGE — AT LESS COST!

CONSTRUCTION MACHINERY CO., WATERLOO, IOWA

How IR Equipment fits into the H

...helping to meet contract dates every bit of the way



1 **DRILLMASTER** – Completely self-contained, self-propelled blast-hole rig for rotary or percussion drilling with the advanced design "down-the-hole" drill.

2 **BIT GRINDER** – Air-powered hand grinding unit and stand for fast, on-the-spot resharpening of large-size Carset Jackbits.

3 **WAGON DRILLS** – Provide complete flexibility for fast, efficient drilling in any position. Easily moved about by hand or with air hoists mounted on the unit.

4 **JACKHAMERS** – A complete line of hand-held drills with the right combination of weight and power for secondary drilling jobs.

5 **GYRO-FLO PORTABLE COMPRESSORS** – Smooth-running, dependable, virtually maintenance-free rotary air compressors in sizes from 85 to 900 cfm.

6 **CRAWL-IR** – Completely new, self-propelled, air-powered, crawler-mounted drill, with hydraulic or manual control of drill tower tilt and swing.

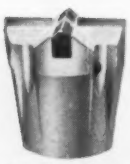
7 **HYDRA-BOOMS** -Gyro-Flo powered and mounted on a truck or tractor, they speed multiple hole drilling at any angle.

8 **QUARRYMASTER** – The larger completely self-contained and self-propelled blast-hole drilling rig for drilling large diameter holes with "down-the-hole" drill.

9 **FORM-PIN DRIVERS** -Standard I-R Paving Breakers with special front-heads, drive pins as fast as you can set them.

10 **DUAL-DRILL RIG** – Specially designed for simultaneous two-hole drilling in trench work.

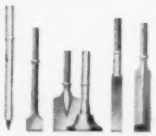
OTHER I-R EQUIPMENT FOR ROAD BUILDING


Carset Jackbits

Bit & Rod Shop Equipment

Jackdrills and Jacklegs

Paving Breakers


Paving-Breaker Accessories

Air Diggers

Backfill Tampers

Sump Pumps

Air Drills

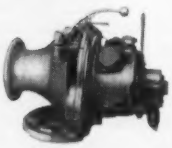
Impactools

Multivane Grinders

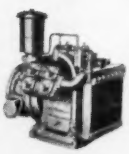
Riveters and Chipping Hammers

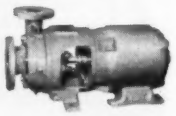
Concrete Vibrators

Air Saws

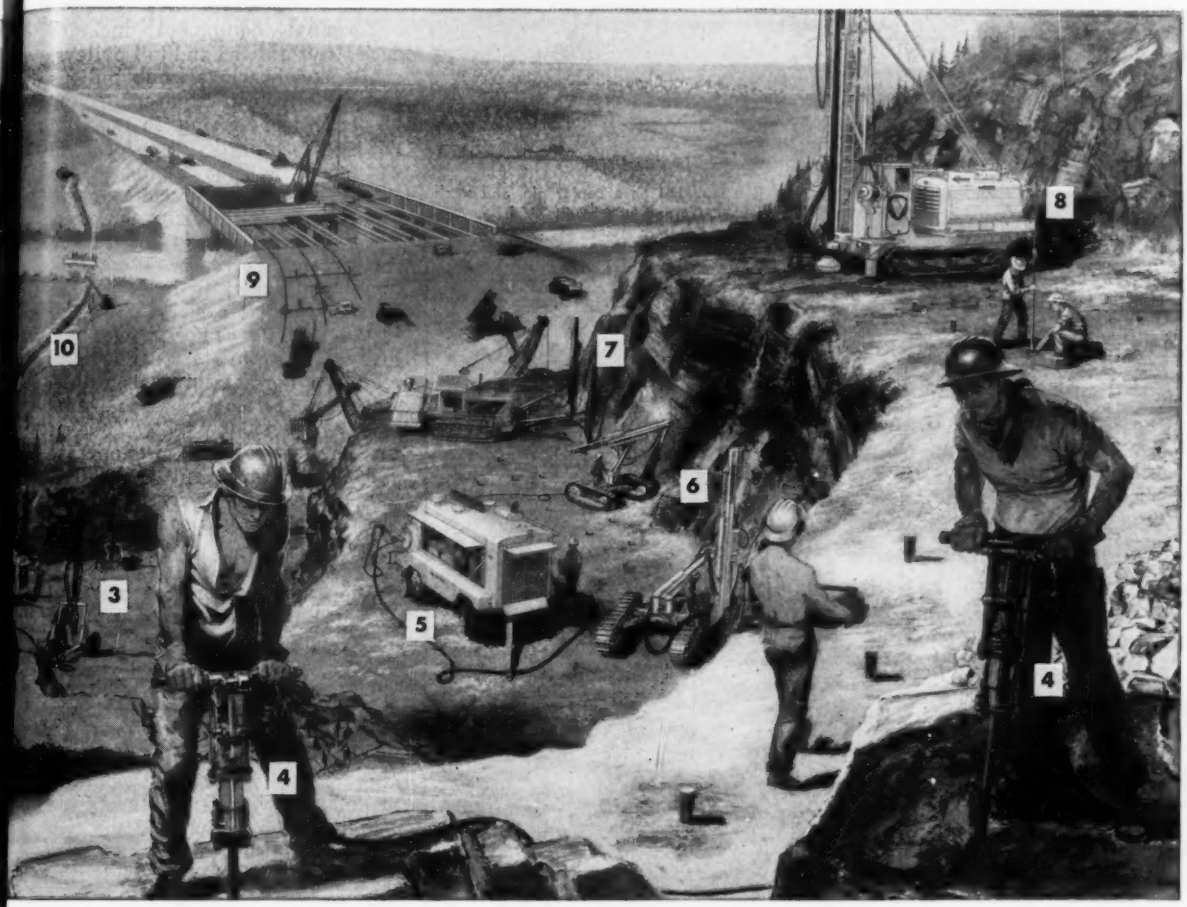

Air Hoists

Spot-Air Compressors


Stationary Compressors


Motorpumps

Highway Construction Picture



FROM big rock cuts to form-pin driving and backfill tamping, Ingersoll-Rand air power equipment plays a leading role in modern highway construction.

The first and biggest job on many sections is to *get out the rock* — and that's where the complete I-R line of rock drills and compressors can speed up the work every bit of the way.

On tunnel jobs, too, as well as in ditching and pipelining, specialized I-R drilling equipment saves time, effort and expense — helps you keep to schedule all along the line.

Work-saving air tools cut costs on bridge and structural steelwork, on wood forms and shoring, concrete vibrating and literally hundreds of jobs where operator fatigue can be reduced by use of low-cost Ingersoll-Rand air power.

Shown here are the major items of Ingersoll-Rand equipment for modern highway construction — all designed and built to work together as a time-saving, cost-saving *Contractors' Combination*. For the complete story, be sure to see the Ingersoll-Rand exhibit, Booth No. 712 at the Road Show — or write for your copy of Bulletin No. 202D.

IR CONTRACTORS' COMBINATION

14-474

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Ingersoll-Rand

11 Broadway, New York 4, N.Y.

SELF-ALIGNING IDLER helps keep belt trained. It is mounted on a center pin, and small vertical side rollers cause it to turn when belt hits them. Turned idler redirects belt.

No *ordinary* cooling system could have done it! To help make Wisconsin Engines first choice everywhere, it took a *special* system with these *finer points.*

- A high-capacity fan, integrally cast with flywheel, pushes more air through engine.
- Time-engineered, time-tested cooling fin design integrally cast in cylinder blocks and heads.
- Scientifically designed and placed air shrouding, providing correct heat dissipation.

The result . . . trouble-free operation, sub-zero to 140° temperatures. Write for S198 . . . handy service map and list of approved service stations.

Air Cooling

...another reason why WISCONSIN ENGINES rank 1st in the world, 3 to 36 hp.

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MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

Better Performance Depends on Better Features....

PRODUCING AGGREGATES . . .
continued

clearance when the installation is along the ground or in a tunnel.

Terminal Equipment

Terminal equipment includes such items as head and tail pulleys, shafts and bearings, snub pulleys and shafts (when required), countershafts, and gearing. In the well designed conveyor, the terminal equipment will be engineered to meet the horsepower requirements of operation. Obviously, however, it is not economically practicable for a manufacturer to design terminal equipment to meet precise horsepowers for every conveyor installation. Hence horsepower ratings are made in steps conforming with the normal intervals established for electric motors; as examples, 3, 5, 7½, 10, 15, etc. Thus, if the horsepower required to operate a conveyor turns out to be 8½, terminal equipment corresponding to a 10-hp rating is specified.

Idlers

The idlers support the belt and provide the rolling mechanism for movement of the load. On top of the frame are the troughing idlers. Underneath (on channel frames) or inside the frame near the lower chord (on truss-built frames) are the return idlers.

Troughing idlers are generally made up of three rollers, the center one horizontal and the two outer ones installed at an angle of approximately 22 deg. Thus the loaded belt is troughed to hold maximum volume of material without spillage over the sides. Return idlers are invariably one-piece rollers, permitting the belt to lie flat on the return cycle.

The efficient conveyor calls for idler rolls mounted in roller bearings or ball bearings. Most idlers now are manufactured with shafts that turn in the bearings. Idlers may be built with factory-sealed bearings that do not require greasing after installation. Bearings that do require greasing generally have a labyrinth seal to keep out dirt, dust, and water. Under average operating conditions, greasing these once a month should suffice. Idlers should be inspected daily, however, to make sure that none is sticking or is being prevented from turning by accumulated droppings of material. The wall of an idler that does not turn is quickly worn through by the action of the belt.

Continued on page 255

Want more POWER

for faster scraper loading?

At work on a roadbuilding job in Kansas, Twin-C tractor push-loads 8 Tournapull with heaped load of sticky gumbo in ½ minute in short loading distance. With powerful 416 hp "Twin-C" behind it, 'Pull's scraper blade easily digs in, carves out tough material.

The best answer to today's need for more effective push-power behind your scrapers is the new 4-wheel drive, twin-engine Twin-C tractor. Highly maneuverable, this giant 416 hp rubber-tired tractor positions fast. One-man with "Twin-C" piles heaping loads in your biggest production scrapers in a hurry . . . often eliminates need for tandem pushers.

Prime factors in rig's exceptional pushing production are its 416 horses, driving 40 tons of machine through 4-wheel drive traction and tires 2½′ wide and over 7′ high.

Twin engines, drive trains, boost push-power

Two independent drive trains, powered by two synchronized 208 hp GM Diesel engines, each have low-pressure, trouble-free torque converters to provide an infinite ratio of speed ranges. These converters automatically transform engine power into most efficient ratio of pulling power and speed to fit your changing demands in the cut. As a result, "Twin-C" delivers maximum drawbar pull, maintains strong, constant contact between pusher and scraper — regardless of scraper loading-speed, material, or underfoot conditions. Recent Dynamometer tests, made in sandy clay footing, with optimum moisture content, showed "Twin-C" registers an *actual* 65,900-lb. drawbar pull in 1st gear!

Power-transfer differentials add tractive power

For best ground-gripping traction in sand, mud, or other loose materials, big-tired "Twin-C" is equipped with 2 exclusive power-transfer differentials — one for each pair of drive-wheels. These differentials automatically transfer power from slipping wheel to wheel on firmest footing . . . keep pusher driving ahead when going is tough.

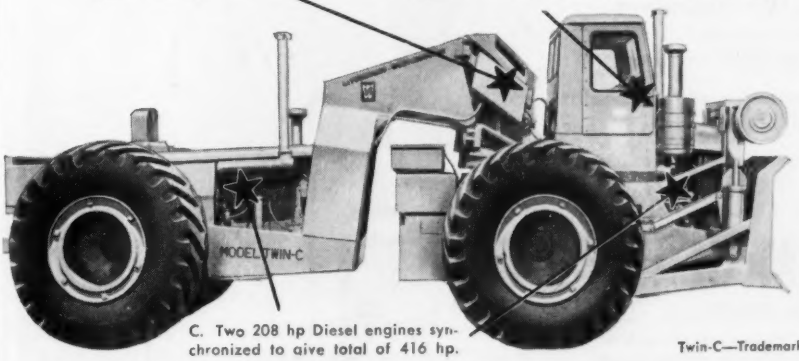
"Twin-C" . . . easy to control

Simple fingertip electric controls on "Twin-C" respond instantly in any weather. They provide positive power-steer . . . power-positioning of sturdy, concave push-plate. Operator smoothly applies massive pushing power as he spots big (49½″ x 88″) floating push-plate behind scraper push-block . . . always gives you fast, profitable scraper-loading.

Fast positioning speeds work cycle

Rubber-tired speeds, geared king-pin power-steering, and synchronized constant-mesh transmissions make the "Twin-C" very maneuverable in the cut. Fast forward speeds, to 20 mph, plus easy maneuverability, let tractor operator position fast behind scraper. With power-steer and high reverse speeds, rig loses no time backing up and getting into position for push-loading the next scraper.

Constant-mesh transmissions give any gear ratio instantly. With gears always in mesh, you eliminate delays in changing gears . . . save vital momentum, reduce costly "lug downs" and gear changes that slow down other pushers. "Twin-C's" power, speed and mobility prevent loading delays.


A. Geared king-pin power steering.
B. One operator using push-button control perfectly matches direction, power, and speed of scraper.
MODEL TWIN-C
C. Two 208 hp Diesel engines synchronized to give total of 416 hp.

King-sized pushing power for your fleet

If your fleet includes production scrapers of any kind, you will want more information on the powerful, big-capacity LeTourneau-Westinghouse Twin-C tractor. This revolutionary new pusher will increase the length of your work season . . . keep your dirtmoving cycles rolling for better profits. Call or write for more complete details.

Twin-C—Trademark, Tournapull—Trademark Reg. U.S. Pat. Off. TW-1095-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

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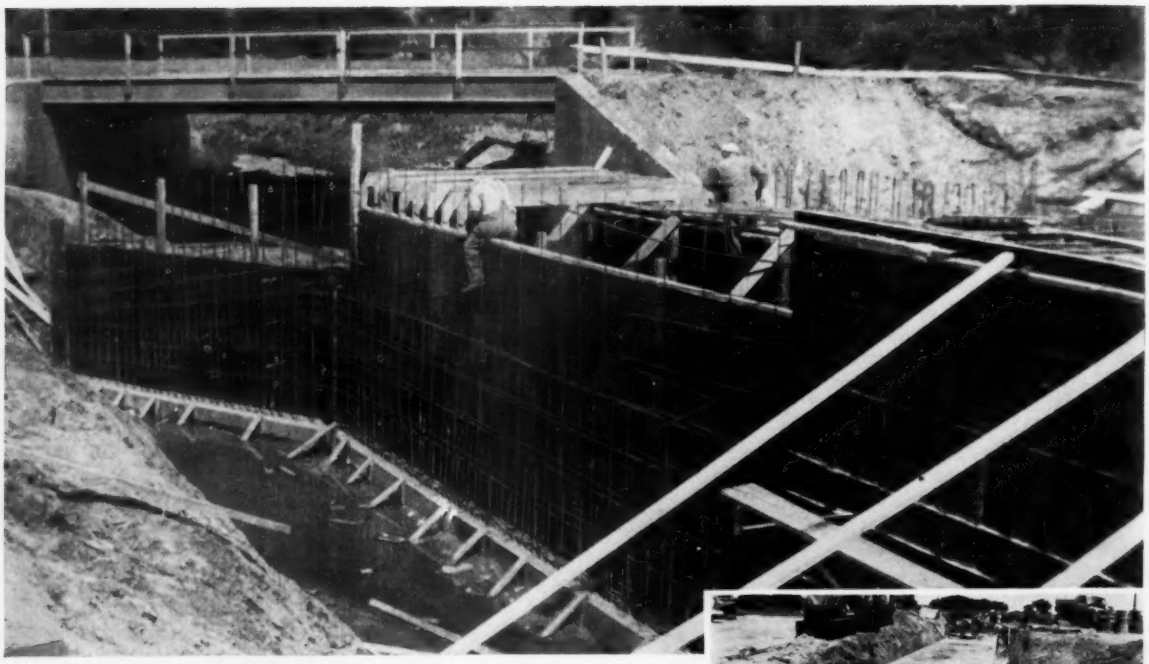

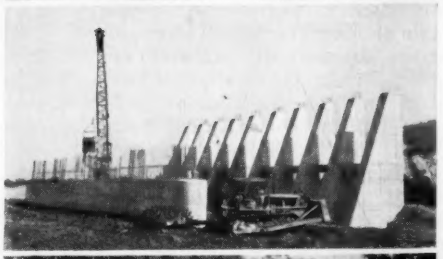

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3. UNI-FORM Tie Key

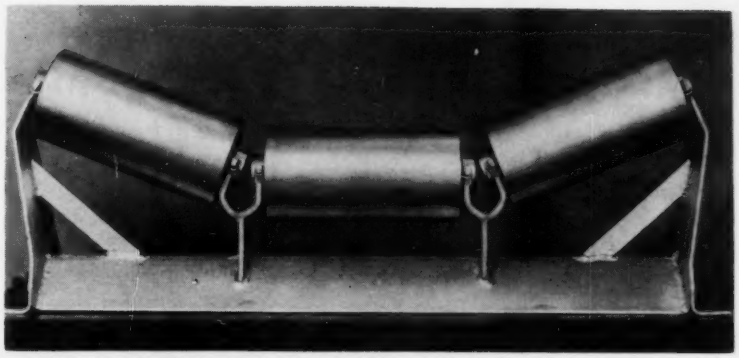
1. Steel framed, plywood faced UNI-FORM Panel

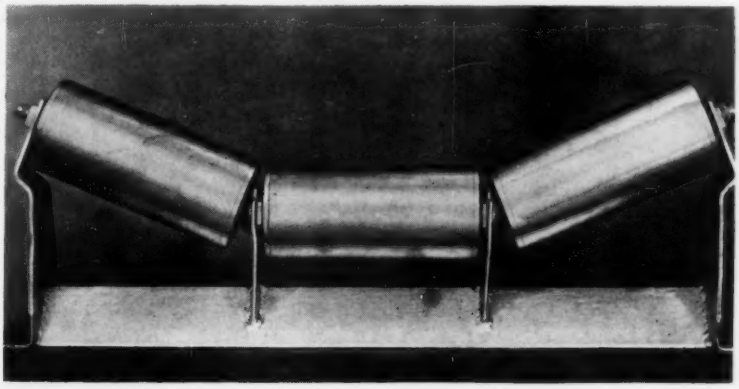
PRODUCING AGGREGATES . . .
continued

For specific purposes, troughing idlers with the outer rolls at an angle greater than 22 deg are available.

When belts are difficult to keep in alignment, self-aligning idlers help keep the belt trained. Such idlers turn about a center pin, with vertical rollers at the extreme ends. When these rollers are contacted by the belt, the idler is moved forward on that side, causing the belt to move toward the opposite side. In long conveyors, a self-aligning idler at each 50-ft interval may be sufficient. However, this point should be made clear: If the conveyor frame is a substantial one, well anchored to the supports to prevent side sway, and if the normal troughing idler brackets are built or installed so that they tilt forward approximately 2 deg, the need for self-aligning idlers is greatly minimized.

Impact idlers are designed for use under the belt at loading points. They have rolls built up from rubber discs of various cross-sectional shapes, which yield sufficiently to prevent the anvil effect





TROUGHING IDLERS may be fitted with factory-sealed anti-friction bearings (top) that require no extra greasing, otherwise they should be lubricated at least once a month.

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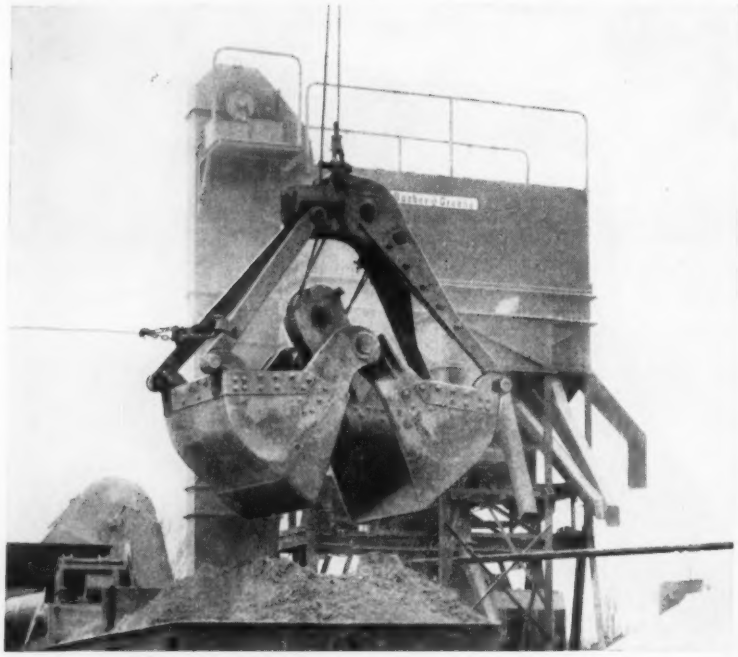

ERIE rehandler shown charging hopper of rotary drum dryer unit of the Gregg County Barber-Greene Asphalt plant.

BUCKET CABLE IN USE MORE THAN A YEAR AT ASPHALT PLANT, GREGG COUNTY, TEXAS

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In 1951, his Gregg County Highway Department bought an ERIE bucket for their Barber-Greene 840 Asphalt Plant. And it was a USED bucket—one that had already seen several years service!

Today, four years later, Mr. Scroggins reports: "For seven months now our Erie bucket has handled 500 tons of slag daily. It's been more than a year since we've even had to change the cable."

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These features make ERIE the bucket experienced operators prefer:

1. Top closing power from block and tackle, plus lever arm construction, plus precision balancing.
2. Manganese steel teeth and high carbon steel lips that bite up full payloads of even toughest clay and gumbo.
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PRODUCING AGGREGATES . . . continued

of the steel roller. From two to four such idlers in a group spaced fairly close together help considerably to reduce belt wear and damage from impact and sharp materials.

Idler Roller Diameter

Two factors affecting roller diameter are belt speed and weight of load carried. A belt traveling at given speed turns a smaller diameter idler roll at a higher rpm than it turns a larger one. Likewise, a heavy load becomes more punishing to a belt as idler roll diameter decreases. Therefore, much depends on the roll's bearings, the quality of belt used, and the weight of the load.

Assuming a well designed idler and a good quality belt, the following rule of thumb may be used as a guide:

Belt Speed	Roll Diameter
250 - 350 fpm	4 in.
350 - 450 fpm	5 in.
450 - 550 fpm	6 in.

Idler Spacing

The spacing of idlers along the conveyor frame is based on two prime considerations: (1) the strength of the idler itself, and (2) the permissible sag in the loaded belt between idlers. Conveyor manufacturers all furnish data to indicate how far apart their idlers should be spaced for different widths of belt. These data are not uniform. However, for all practical purposes it may be listed as:

Belt Width	Max. Spacing
18 - 24 in.	5 ft.
30 - 36 in.	4 ft.
42 - 48 in.	3½ ft.

Return idlers usually are spaced 10 ft apart.

Likewise, there are many ways in which the number of idlers for any given length of conveyor can be determined. The following method has considerable merit:

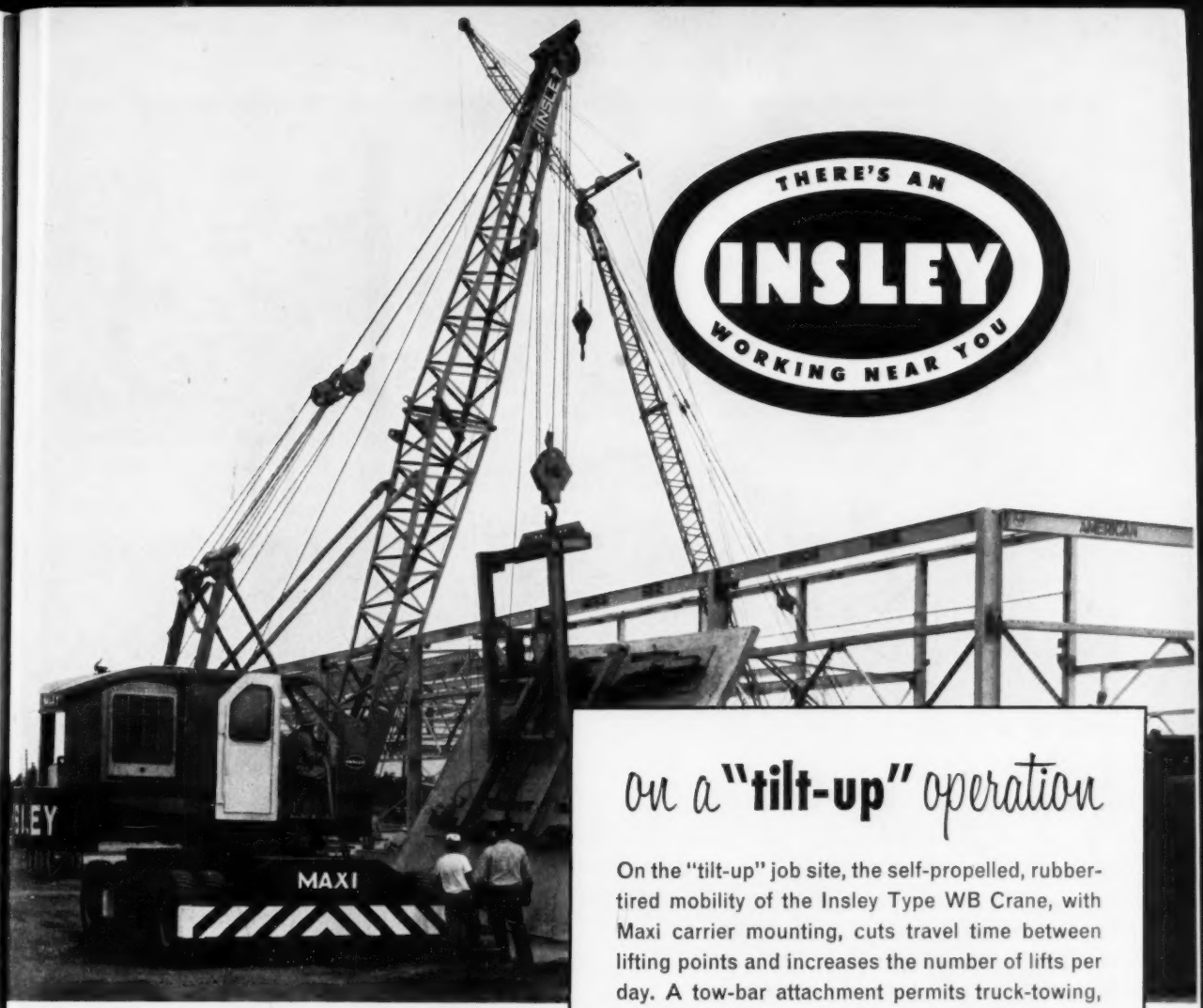
Number of Troughing Idlers

1. Two on the tail section under loading point.
2. One 6 in. ahead of tail section joint frame.
3. Balance at standard spacing outlined above.

The total number is readily derived through use of the formula:

$$N = \frac{L - 7}{S} + 3$$

Continued on page 259



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on a "tilt-up" operation

On the "tilt-up" job site, the self-propelled, rubber-tired mobility of the Insley Type WB Crane, with Maxi carrier mounting, cuts travel time between lifting points and increases the number of lifts per day. A tow-bar attachment permits truck-towing, at a fast travel speed for long hauls between job locations.

There's an Insley working near you . . . on a construction job, in a plant storage yard, on a pipeline project, in fact, wherever dependable excavator-crane service is a requirement.

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For additional information write the Insley Manufacturing Corporation, Indianapolis, Ind.

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Wagon drills, equipped with Bethlehem Hollow, in use on Connecticut Turnpike. Contractor: The Savin Construction Corporation.

Moving 570,000 cu yd of rock for section of Connecticut Turnpike

Wagon drills equipped with Bethlehem Hollow Drill Steel were used in force recently to speed the removal of 570,000 cu yd of medium-hard rock, so that construction of nearly nine miles of the Connecticut Turnpike could get underway in the Norwalk area.

On this portion of the 129-mile toll road, which is to extend from Greenwich, near the New York line, to Killingly, at the Rhode Island boundary, Bethlehem Hollow Drill was used in 1¼-in. rounds and hexagons, fitted with carbide-insert bits. It gave excellent performance in making blast holes from 8 ft to 26 ft deep.

Whether it's a road project or some other type of rock removal, you can't go wrong with Bethlehem Hollow. This is because it is rolled from fatigue-resistant steel. Bethlehem Hollow has a uniform hole, centrally located in the bar. It also has a wide quenching range. It is easy to heat-treat for the proper balance of toughness and wear-resistance, resulting in long-wearing threads and strong shanks.

Bethlehem Hollow comes in Carbon and Ultra-Alloy grades in rounds, hexagons and quarter-octagons. It is regularly furnished in lengths of from 18 ft to 27 ft, although longer lengths can also be supplied.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM HOLLOW DRILL STEEL CARBON AND ULTRA-ALLOY

BETHLEHEM STEEL

PRODUCING AGGREGATES . . .
continued

Where: N = Number of troughing idlers
L = Center to center distance in feet between head and tail pulleys.
S = Idler spacing in feet (see above)

Example: L = 70 ft; S = 4 ft

$$N = \frac{70 - 7}{4} + 3 = \frac{63}{4} + 3 = 15\tfrac{3}{4} + 3$$

$= 18\frac{3}{4}$, or 19 idlers*

* With fraction use next whole number

Number of Return Idlers

1. One idler on tail section joint frame. (When 2, 3, 4, or 5-ft. extension section is used, section should be installed just ahead of the tail section. In this case, no idler is mounted on tail section joint frame. When total length of short extensions exceeds 5 ft, one idler is mounted on tail section joint frame.)
2. One idler on head section joint frame. (When snub pulley is used, no idler is mounted on head section joint frame.)
3. One idler on each joint frame between 10-ft extension sections. (If 15 or 20-ft extension sections are used, one idler is mounted also in the middle of each such section; when vertical gravity belt tightener is used, one idler is omitted at this point on frame.)

The total number is readily derived through use of the formula:

$$N = \frac{L - M - P + R}{10}$$

Where: N = Number of return idlers
L = Center to center distance in feet between head and tail pulleys
M = 1 when gravity belt tightener is used;
= 0 when not used
P = 1 when snub pulley is used;
= 0 when not used
R = 1 when a 15-ft extension section is used;
= 0 when none is used

Examples: (1) L = 68 ft, no gravity belt tightener, no snub pulley, 10-ft sections:

$$N = \frac{68 - 0 - 0 + 0}{10} = \frac{68}{10} = 6.8 \text{ or } 7 \text{ idlers*}$$

(2) L = 235 ft, with gravity belt tightener, with snub pulley, 20-ft sections, one 15-ft section

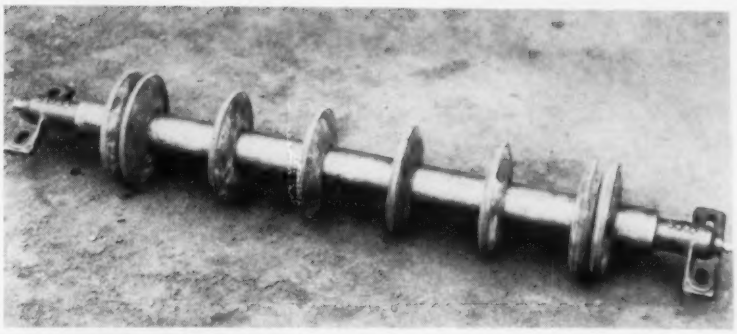
$$N = \frac{235 - 1 - 1 + 1}{10} = 23.5 - 1$$

$= 22.5$ or 22 idlers*

* When fraction occurs and is ½ or less, use next lower whole number; when greater than ½, use next higher whole number.

Conveyor Belts

Conveyor belts for handling aggregates are generally specified



SPECIAL RETURN IDLER carries belt on rubber discs to stop build-up of sticky material.

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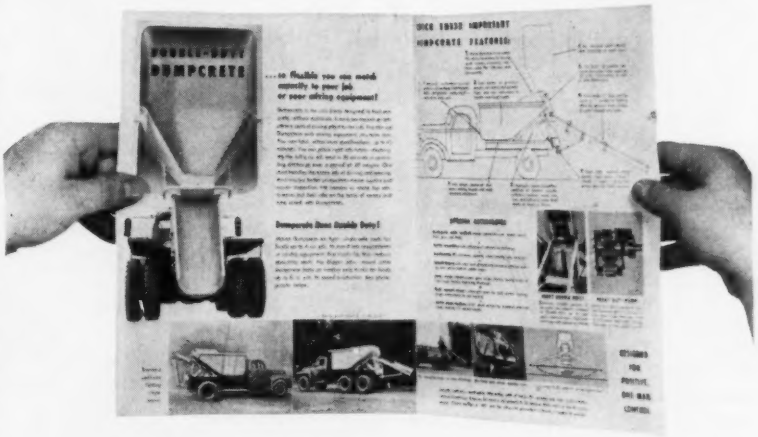

Get all the facts about the new "Double-Duty"

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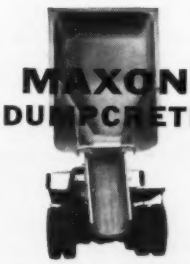

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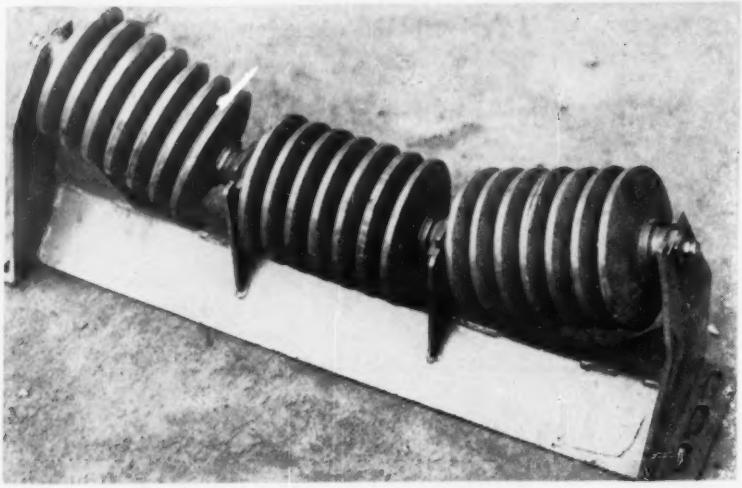


IMPACT IDLER has solid steel shell replaced by series of rubber discs to cushion drop of material falling on to belt. Used in group at loading point, they aid belt life.

in terms of number of plies, weight of duck, tensile strength, and thickness of rubber forming the top cover and that formnig the bottom cover.

Plies are the layers of duck within the belt to form the carcass. The duck is made up of cotton yarn woven as for ordinary canvas with the warp running lengthwise with the belt and the filler running crosswise. This duck conforms to established standards and is the same for all belt manufacturers. Specifications for 28-oz duck are 400 lb minimum ultimate tensile strength. For 32-oz duck the specifications call for 800 lb. Thus the minimum tensile strength of a five-ply belt made of 28-oz duck will be 2,000 lb; whereas for a six-ply belt of 32-oz duck the minimum tensile strength will be 4,800 lb.

Larger diameter pulleys are required as the number of plies increases. Also, the more plies for any given width of belt, the more difficult troughing becomes because the belt is stiffer. Hence, in belt selection, the matter of stress equivalents becomes an important consideration, particularly for belts of five or more plies.

Frequently it is more economical from the purchaser's standpoint to check into a belt of heavier duck having fewer plies. The right duck selection will enable the use of a less expensive belt at times, while providing an adequate belt for the job. For aggregates handling, 28-oz and 32-oz duck are most common. The table below represents what belt technicians consider safe working stresses in pounds per inch of width per ply.

Safe Working Stress
Pounds Per Inch of Width Per Ply

Belt Duck	Using Metal Fastener	Using Endless Vulcanized Splice
28-oz.	25	30
32-oz.	30	35

As an example:
A five-ply, 28-oz duck belt would have a safe working stress of 5 x 25, or 125 lb per inch of belt width; whereas a four-ply, 32-oz duck belt would have a safe working stress of 4 x 30, or 120 lb per inch width of belt. The price per foot of each belt should be checked before deciding to buy, as either belt would be satisfactory for the job.

Along with the check outlined above, some further comparisons between the 28- and 32-oz duck should be made. The 28-oz duck is softer and will not stand abrasion as well as 32-oz duck. It is suitable for small pulleys and high speeds. Three to six plies is the normal range for conveyor belts.

The 32-oz duck has low stretch and is fairly abrasion resistant. It holds fasteners and bolts better than the lighter weights. It is of tight twist and is high in tensile strength, and is suitable for long conveyors and elevators. In conveyor belts, the range of plies is three to eight.

A conveyor belt's durability depends to a great extent on the amount of rubber covering. Too much rubber increases resistance to flexing, whereas too little decreases belt life. However, it is pretty much standard practice now to call for a belt with ⅛-in. top cover and 1/32-in. bottom cover.

Table I (page 264) gives some maximum and minimum plies for belts used on troughed conveyors for handling the materials indicated.

Conveyor Belt Speeds

Actually, there are no definite speeds at which a conveyor belt should travel. Each manufacturer has chosen a speed around which his terminal equipment is designed. His values for capacity and horsepower requirements are based on this speed. Fortunately for the contractor or producer, there are perhaps more aggregates handling conveyors designed around a belt travel of 300 fpm than any other speed, which should enable him to make some comparisons.

All other factors being equal, a belt theoretically will deliver twice as much material at a speed of 600 fpm as it will at 300. However, there may be slippage of the material at the higher speed and, of course, the belt wear will be materially increased. Also, the conveyor as a whole may not be designed for the high speed, even though the amount of material on the belt at any given time would be the same at either speed. Very often the speed of a conveyor has to be kept below normal to prevent fragmentation and degradation of the material through movement and impact.

Table II (page 264) shows recommended maximum belt speeds for various materials carried on different belt widths.

Angle of Incline of Conveyors

Most conveyors used in the production of aggregates can be run with a high degree of efficiency at an angle of 18 deg. When this angle is exceeded for crushed stone, some slippage may occur. In boulder gravel, some roll back may be noted beyond 19 or 20 deg. As a guide to maximum angles for greater efficiency the following table can be used.

Material	Maximum Angle of Slope, Degrees
Loose Earth	20
Bank Gravel	18
Washed Gravel	12
Damp Sand	20
Dry Sand	15
Crushed Stone	19
Quarry Rock	16

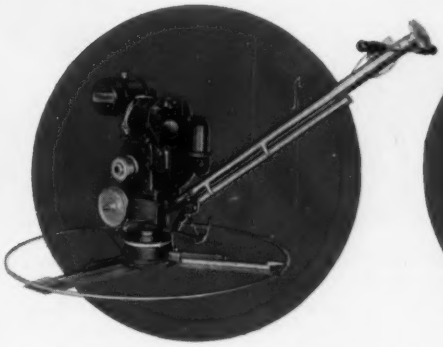
Continued on page 264

WHICH Whiteman FINISHER IS BEST for YOU?

MODEL M — Small, compact for light construction. 29" dia. Combination trowels for floating and finishing.

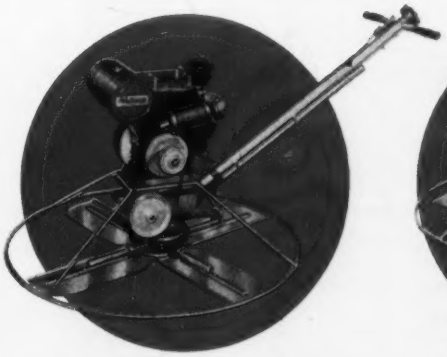
MODEL J-1 — Medium machine for general use. 34" dia. Float trowels snap on in seconds. Largest selling model.

MODEL JA-4—For average size jobs. Four trowel design. 34" dia. Combination floating-finishing trowels. Fixed ring.

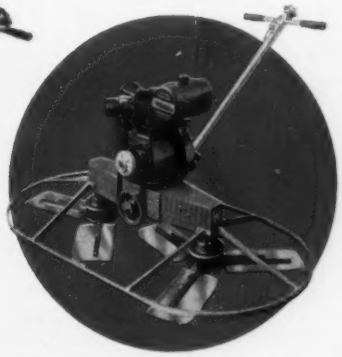


MODEL B-1 — Suitable for large areas. 44" dia. Snap-on float trowels. Rugged, dependable.

DISC FLOAT for dry mix and patented method slabs. Grinding attachments available.



MODEL C-4 — Large, heavy duty. 46" dia. Four combination trowels for floating or finishing. Fixed ring.



TWIN Finishes a full 5' width. Does the work of more than two machines. Combination floating-finishing trowels. Fixed ring.

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Made of especially engineered, extremely hard, durable tool steel, Whiteman trowels give 4 times the service of ordinary trowels—produce a smoother better slab. Insist on **genuine** Whiteman trowels!

Only Whiteman builds a **complete** line of concrete finishing machines...each specifically designed for a particular need...each incorporating superior Whiteman engineering based on 16 years experience — plus the exclusive features and rugged construction that have made Whiteman the undisputed leader. Ask your Whiteman distributor to show you the model that is best for you.

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During the past 16 years, Whiteman has made and thoroughly tested both rotating and stationary-ring machines and currently builds both types. Each has certain advantages and will finish equally close to walls, columns, etc. Consult your Whiteman dealer about the type best suited for your needs.

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Take another look at this Mid-West quarry operation. It introduces the ¾-yard 305 — latest in a new series of Koehring heavy-duty excavators and cranes. Better check its all-around versatility and *extra work capacity* for digging, lifting and material-handling (more details are listed below).

On 13.4-mile highway contract in one of the central states, 1,500 to 2,000 tons of aggregates were handled daily by Koehring 605 clamshell crane. Its wide work-radius speeded stockpiling, and charging into Johnson bin. Contractor also maintained fast schedule at other end of job, where two Koehring 34-E *twinbatch*® pavers poured 24-foot concrete pavement, 9 inches thick.

To eliminate a bottleneck on this highway widening job, it was necessary to rebuild bridge, and widen the approaches. Concrete pilings were set and driven by Koehring 405 crane. It has up to 20-ton lift capacity, boom lengths from 40 to 90 feet. Or, for maximum reach, 80-foot boom can be used with 15 to 30 feet of jib.

Here are some figures that will interest you:

KOEHRING MODEL	SIZE DIPPER	LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load.)	
205 CRAWLER	½-Yd.	20,000 lbs.	at 10-foot radius
205 ON RUBBER	½-Yd.	30,000 lbs. 13,700 lbs.	at 12-foot radius at 20-foot radius
305 CRAWLER	¾-Yd.	30,000 lbs.	at 12-foot radius
305 ON RUBBER	¾-Yd.	50,000 lbs. 15,800 lbs.	at 10-foot radius at 30-foot radius
405 CRAWLER	1-Yd.	40,000 lbs.	at 12-foot radius
605 CRAWLER	1½-Yds.	72,300 lbs.	at 12-foot radius
1205 CRAWLER	3-Yds.	190,000 lbs.	at 13-foot radius

KOEHRING HEAVY DUTY

Want more information? Call Koehring distributor today.

Reinforced concrete slabs on this West Coast building job required careful handling — and plenty of lift capacity. Contractor brought in 2 Koehring truck cranes — a 25-ton 304, and this 15-ton 205. They often worked as a team, using combined lift capacities to handle heavy slabs, and erect structural steel. On next job, in the Sierras, the 205 truck crane hoisted and placed pumps and other heavy machinery at construction site for new dam. Its travel is unrestricted. Axle-load meets highway regulations in most areas — even when carrying 25-foot crane boom over the steering end.

See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957

KOEHRING COMPANY Milwaukee 16, Wis. Subsidiaries: JOHNSON PARSONS • KWIK-MIX

TABLE I

Maximum and Minimum Plies for Troughed Belts

Minimum Plies to Support Load

Belt Width	Fine Coal, Sand, Crushed Stone			Fine Ores, Lump Coal, Large Stone or Gravel				Coarse Ores or Other Heavy Materials			Maximum Plies for Troughing			
Inches	28 Oz.	32 Oz.	36 Oz.	28 Oz.	32 Oz.	36 Oz.	42 Oz.	32 Oz.	36 Oz.	42 Oz.	28 Oz.	32 Oz.	36 Oz.	42 Oz.
16	4	4	....	....	....	....	....	....	....	....	4	4	....	....
18	4	4	....	6	5	....	....	5	....	....	5	5	....	....
24	5	4	4	6	5	5	4	5	5	5	6	6	5	5
30	5	5	4	6	6	5	4	6	6	5	7	7	6	6
36	5	5	5	6	6	6	5	7	7	6	9	9	8	7
42	6	5	5	7	7	6	5	8	7	6	10	10	9	8
48	6	5	5	8	7	6	6	9	8	7	12	12	11	9
60	7	6	6	9	8	7	6	10	9	8	....	13	13	12

The maximum plies for troughing are based on standard 3 pulley 20° troughing idlers (or 5-pulley idlers with 15° and 30° angles). With special shallow troughing idlers somewhat thicker belts may be used if tension requires. (Data from Goodyear Tire & Rubber Co.)

TABLE II

Recommended Maximum Belt Speeds

	Width of Belt, Inches			
	16,18	20,24	30,36	42,60
Light or Free-Flowing Materials such as Grain, Dry Sand.....	500	600	750	850
Moderately Free-Flowing or Sized Materials such as Sand, Gravel, Fine Stone and Coal.....	300	400	500	550
Lump and Mod. Heavy or Abrasive Materials such as Run-of-Mine Soft Coal, Coarse Stone, Crushed Ore...	250	350	400	450
Heavy, Sharp, or very Abrasive Materials such as Run-of-Mine Hard Coal, Hard Ore, Coke.....	.....	250	300	350

NOTE: Above recommendations are subject to practical allowances for methods of loading, angle of incline, auxiliary equipment, etc.

pavers backhoes loaders

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load 'em faster!
haul 'em safer!

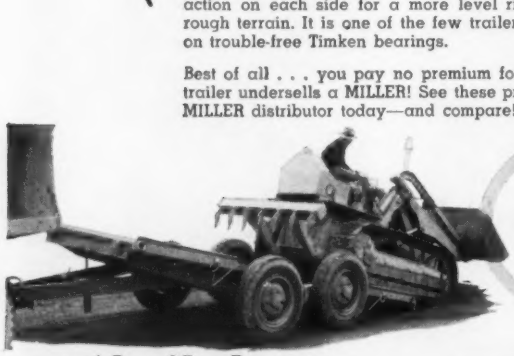
the shortest time between jobs — a MILLER *Tilt-Top!*

Model "OT"-13 tandem $2,295.00*

It takes just ONE man to load this big Barber-Greene paver on the Miller OT-13 ton Tilt-Top . . . the shortest time between jobs for whatever equipment you haul. Faster loading, precise easy backing, on-a-dime maneuverability, cuts time between jobs . . . ups your *profit*—production time for men and equipment every day! Tilt-tops from 3 to 15 tons capacity—equipped with single or tandem axles . . . over-the-wheels or between-the-wheels platforms . . . put mobility under dozers, pavers, rollers, and trenchers of almost any size and shape.

Built for the "long haul", all Tilt-Top models have MILLER'S massive "EDG-SUPPORT" frames, Timken roller axle bearings and 2" oak deck platforms. Tandem models are equipped with a heavy box section walking beam that provides independent wheel action on each side for a more level ride and less jarring over rough terrain. It is one of the few trailer walking beams mounted on trouble-free Timken bearings.

Best of all . . . you pay no premium for quality—no comparable trailer undersells a MILLER! See these production boosters at your MILLER distributor today—and compare!



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PRODUCING AGGREGATES . . . continued

When material is carried by a conveyor from a point on the ground to some elevated point, it travels the diagonal of the path it would take were it moved horizontally from the first point and then hoisted straight up to the second point. A chart on page 267 shows these relationships at various slopes. While this chart may appear somewhat confusing at first, use of it a few times will make it quite clear as to the steps involved. It can also be used to determine the height of support towers, as shown.

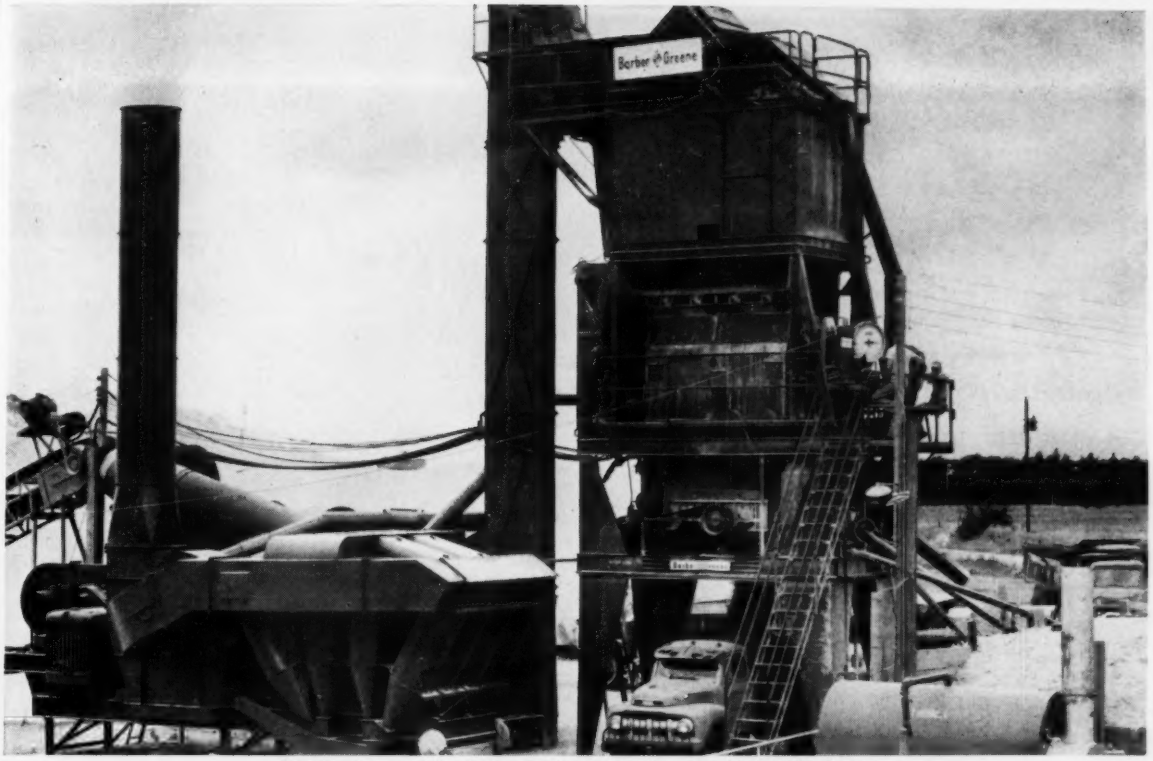
Conveyor Capacities

The capacity of a belt conveyor in terms of tonnage delivered per hour will be dependent on the width of belt, the speed of belt travel, density of the material, and how fully the belt is loaded. Therefore one can only establish what the maximum capacity will be for a given width of belt carrying a certain type of material at a given belt speed.

As most construction aggregates will weigh in the neighborhood of 100 lb per cu ft, Table III based on this density of material is given on page 268. For materials weighing less than, or more than, 100 lb, multiply the capacities shown by factors derived by dividing the weight per cu ft of the material by 100.

Capacities are closely proportional to belt speed. By increasing or decreasing belt speed, the capacity (for all practical purposes) is increased or decreased a like percentage.

Frequently it is desirable to know how many yards of material a conveyor of given width and belt speed will deliver per hour. In this case Table IV (page 268) can be used. But here, it should be noted,



Owned and operated by the San Ore Construction Company, this BatchOmatic sets the pace in production on the 18.5 miles of asphalt construction on the Kansas Turnpike.

Biggest asphalt producer on the Kansas Turnpike...the Barber-Greene BatchOmatic

Hitting peaks of 230 tons per hour, this Barber-Greene BatchOmatic is top producer on the Kansas Turnpike, automatically measuring and mixing batch after batch.

The Barber-Greene BatchOmatic is the first plant ever designed from its original conception for automatic operation. More and more owners and operators report this is the plant that boosts production, cuts operating costs and expands their market.

With models available in 2000-, 4000- and 6000-pound sizes, there's a BatchOmatic to meet your needs. In any size you get these exclusive features:

Simultaneous weighing of all sizes of aggregate . . . eliminates the human element in achieving accuracy and maximum capacity.

Instant change-over from automatic to manual operation . . . provides mixes for the drive-in trade . . . instantly reset to preset, repetitive cycle operation.

New Dyna-Mix pugmill . . . gives thorough coating in less time than any other pugmill.

Instant, positive inspection . . . of aggregate gradation and weight.

Three of San Ore's Barber-Greene Finishers paving "in echelon."

56-32 WB

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PRODUCING AGGREGATES . . .
continued

the density of the material is not a factor except as it affects the power required to run the conveyor. To convert yd per hr to short tons per hr, multiply the weight per cu yd of material by yd per hr and divide by 2,000.

Example:
Material weighs 3,000 lb per cu yd. How many tons per hour will be carried by a 24-in. belt traveling 300 fpm?

$$\frac{3{,}000 \times 204 \text{ (from table IV)}}{2{,}000} = 306 \text{ tph}$$

Conveyor Horsepower

The hosepower required to operate a conveyor depends on the amount of work being done and the rate at which it is being done. A conveyor lifts a given number of pounds of material a given distance in a given length of time. Also it moves this material along a horizontal path against the frictional resistance of the moving parts. Thus, for all practical purposes, it can be stated that two horsepowers are involved, one to move the material horizontally and one to lift the load vertically. Added together, these two give the total horsepower required or, as it is called, capacity.

Tables V and VI (page 268) are based on the steps indicated above and may be used to determine the total horsepower required to convey the indicated quantities of materials per hour when the horizontal and vertical distances are known. For tonnages and distances not specifically indicated, it will be reasonably accurate to interpolate, or use proportionate figures.

The figures are based on average conditions with a uniform feed and at a normal operating speed. If a mechanical feeder, tripper, or other attachment is used, add the necessary horsepower.

How to Determine Belt Length

Determining the length of belt required is not difficult if all the necessary factors are kept in mind.

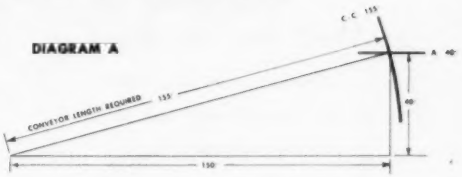
Among these are (1) the center-to-center distance between head and tail shafts, (2) the extra length required to go around the outer arcs of the head and tail pulley, (3) a slight amount of length to account for lagging, snub pulley, screw take-up, etc., and (4) the extra length required for a gravity belt take-up (if used).

Continued on next page

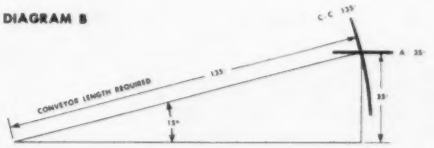
Here's A Chart You'll Find Useful In Several Ways...

TO DETERMINE CONVEYOR LENGTHS...

You can use the chart below to determine the center-to-center length of a conveyor when the lift and horizontal distance are known. For example: If you want a conveyor to carry a load a horizontal distance of 150', with a lift of 40', you will need a conveyor having a center-to-center length of approximately 155'. See diagram (a).



You can use the chart to determine the center-to-center length when the lift and the angle of incline are known. For example: If you want a lift of 35' at an angle of 15°, you will require a center-to-center distance of approximately 135'. See diagram (b).



TO DETERMINE NUMBER AND HEIGHTS OF SUPPORT TOWERS . . .

You can use the chart to determine the number and height of conveyor support towers. For example: Estimate the towers for a conveyor of 180' to run at an angle of 18°.

Assume that the highest tower (No. 1) will be installed at the uppermost joint frame which is 5' back from the center of the head shaft, or at the 175' mark. Allowing for a maximum span of 40', tower No. 2 will be installed at the 135' mark; tower No. 3 at the 95' mark; tower No. 4 at the 55' mark; and support No. 5 at the 15' mark.

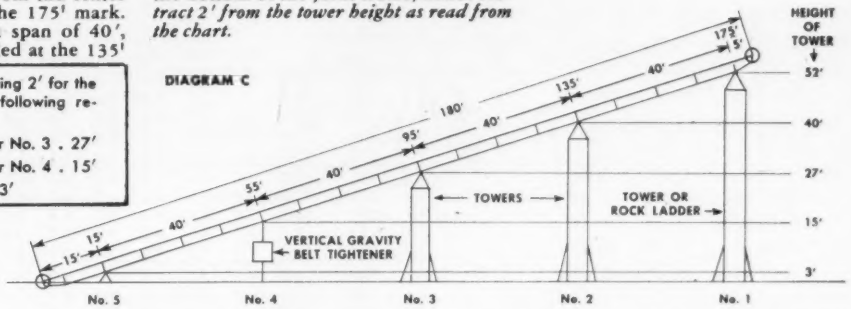
The heights of these towers above the level ground line can be determined from the chart, as indicated in Diagram (c). Remember that the point of support is at the bottom of the joint frame, hence *subtract 2' from the tower height as read from the chart.*

From the chart, and subtracting 2' for the frame depth, we get the following required tower heights:

Tower No. 1 . 52' Tower No. 3 . 27'
Tower No. 2 . 40' Tower No. 4 . 15'
Tower No. 5 . 3'

Tower No. 4 should be a vertical gravity belt tightener.

DIAGRAM C



CONVEYOR INCLINATION CHART

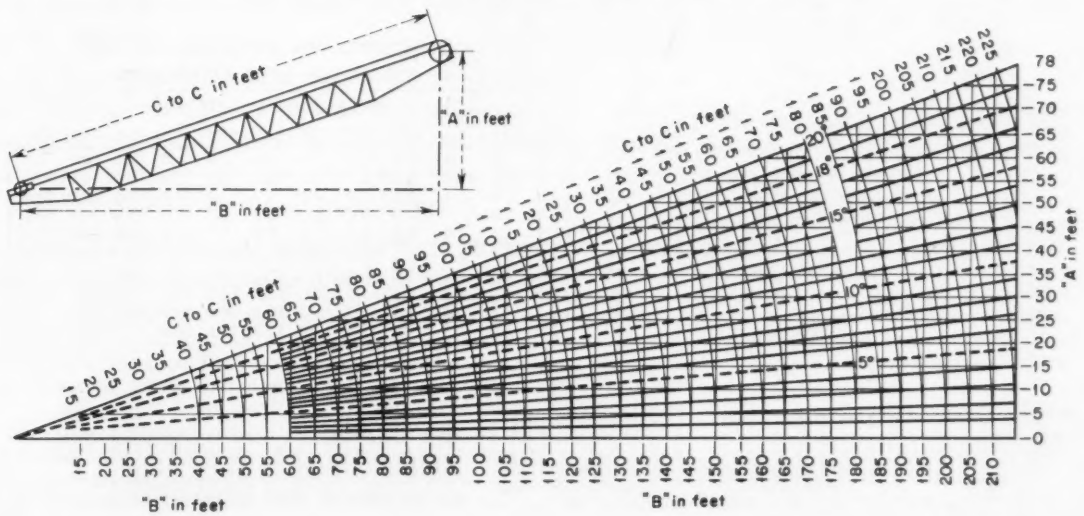


TABLE III

Belt Width Required To Deliver Tonnage Indicated

Maximum Short Tons Per Hour

For Material Weighing 100 Lbs. Per Cubic Foot, Such as Gravel, Crushed Rock, etc.

BELT WIDTH	BELT SPEED IN FEET PER MINUTE			MAXIMUM LUMP SIZE	
	300	400	500	Sized	Unsized
18"	156	—	—	4"	6"
24"	276	368	—	6"	8"
30"	432	576	720	7"	12"
36"	624	832	1040	8"	16"

TABLE IV

Yards Delivered By Conveyors Of Width Indicated

Cubic Yards Per Hour

For Any Material

BELT WIDTH	BELT SPEED IN FEET PER MINUTE		
	300	400	500
18"	114	—	—
24"	204	282	—
30"	331	428	535
36"	462	616	770

PRODUCING AGGREGATES . . . continued

These factors are all expressed in a simple series of steps indicated below:

Step 1. 2 x c-c distance

Step 2.	Head Pulley	Tail Pulley	Footage
Add footage for one of these	14"	10"	4'
	18"	14"	5'
	24"	18"	6'
	30"	24"	8'
	36"	24"	10'

Step 3.

When conveyor measurements fall within:

0 - 120'	Add 0'
121 - 270'	Add 1'
271 - 420'	Add 2'
421 - 570'	Add 3'
571 - 720'	Add 4'
721 - 870'	Add 5'
871 - 1020'	Add 6'

Step 4. For vertical belt tightener, add 14 ft.

Example: Assume a 30-in. belt conveyor is 282 ft long, at 30 hp. It has a 30-in. head pulley and 24-in. tail pulley, with vertical gravity belt take-up.

1. 2 x c-c length, 2x282	564
2. For 30 and 24-in. pulleys, add	8
3. Being in the range 271-420 ft, add	2
4. With vertical gravity belt tightener, add	14
Length of belt required	588 ft.

If it is planned to use a vulcanized, endless belt (a practice increasing in popularity) the need for extra belt to accommodate the overlap must be included. As the vulcanizing will be done in the field after erection of the conveyor, it is best to check with the local vulcanizing service to determine how much extra belt will be required for this purpose.

A conveyor belt will roll back when stopped fully loaded if the horsepower required to lift the ma-

Continued on page 272

TABLE V

HORSEPOWER REQUIRED TO OPERATE LOADED CONVEYOR ON THE LEVEL

LENGTH OF CONVEYOR —Feet	TONS (2000 lbs.) PER HOUR											
	25	50	75	100	125	150	175	200	250	300	350	400
25	1.6	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.7	3.0	3.3	3.5
50	2.0	2.1	2.2	2.4	2.5	2.7	2.9	3.0	3.3	3.6	3.9	4.2
75	2.3	2.5	2.6	2.8	2.9	3.1	3.3	3.5	3.8	4.1	4.5	4.8
100	2.5	2.7	2.9	3.0	3.2	3.4	3.6	3.8	4.2	4.5	4.9	5.3
125	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.6	5.0	5.4	5.8
150	3.0	3.2	3.4	3.7	3.9	4.1	4.3	4.6	5.0	5.5	5.9	6.3
175	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.0	5.5	6.0	6.5	7.0
200	3.5	3.8	4.0	4.3	4.5	4.8	5.0	5.3	5.8	6.4	7.0	7.5
225	3.7	4.0	4.3	4.6	4.8	5.1	5.4	5.7	6.2	6.8	7.3	8.0
250	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.0	6.7	7.3	7.8	8.4
300	4.5	4.9	5.2	5.6	5.9	6.2	6.6	7.0	7.6	8.3	9.0	9.6
350	5.0	5.4	5.8	6.2	6.6	6.9	7.3	7.7	8.4	9.2	10.0	10.7
400	5.5	6.0	6.4	6.8	7.2	7.6	8.0	8.4	9.2	10.0	11.0	11.7
450	6.0	6.5	6.9	7.3	7.8	8.3	8.7	9.2	10.0	11.0	11.9	12.8
500	6.5	7.0	7.5	8.0	8.5	9.0	9.4	10.0	11.0	12.0	13.0	14.0

TABLE VI

HORSEPOWER REQUIRED TO LIFT LOAD ON BELT CONVEYOR

LIFT in Feet	TONS (2000 lbs.) PER HOUR											
	25	50	75	100	125	150	175	200	300	400	500	600
10	.3	.5	.8	1.0	1.3	1.5	1.8	2.0	3.0	4.0	5.0	6.0
20	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	6.0	8.0	10.0	12.0
30	.8	1.5	2.3	3.0	3.8	4.5	5.3	6.0	9.0	12.0	15.0	18.0
40	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	12.0	16.0	20.0	24.0
50	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	15.0	20.0	25.0	30.0
60	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	18.0	24.0	30.0	36.0
70	1.8	3.5	5.3	7.0	8.8	10.5	12.3	14.0	21.0	28.0	35.0	42.0
80	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	24.0	32.0	40.0	48.0
90	2.3	4.5	6.8	9.0	11.3	13.5	15.8	18.0	27.0	36.0	45.0	54.0
100	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	30.0	40.0	50.0	60.0

HERE'S THE *NEW* EUCLID

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31 YARDS HEAPED—24 YARDS STRUCK • 518 H.P.—ALL WHEEL DRIVE
TORQMATIC DRIVES—NO CLUTCH—FULL POWER SHIFTS

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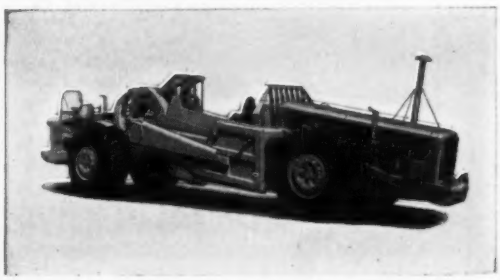
EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

A new Euclid
that sets higher standards of
performance in all soils—wet or
dry—hard clay or loose sand!



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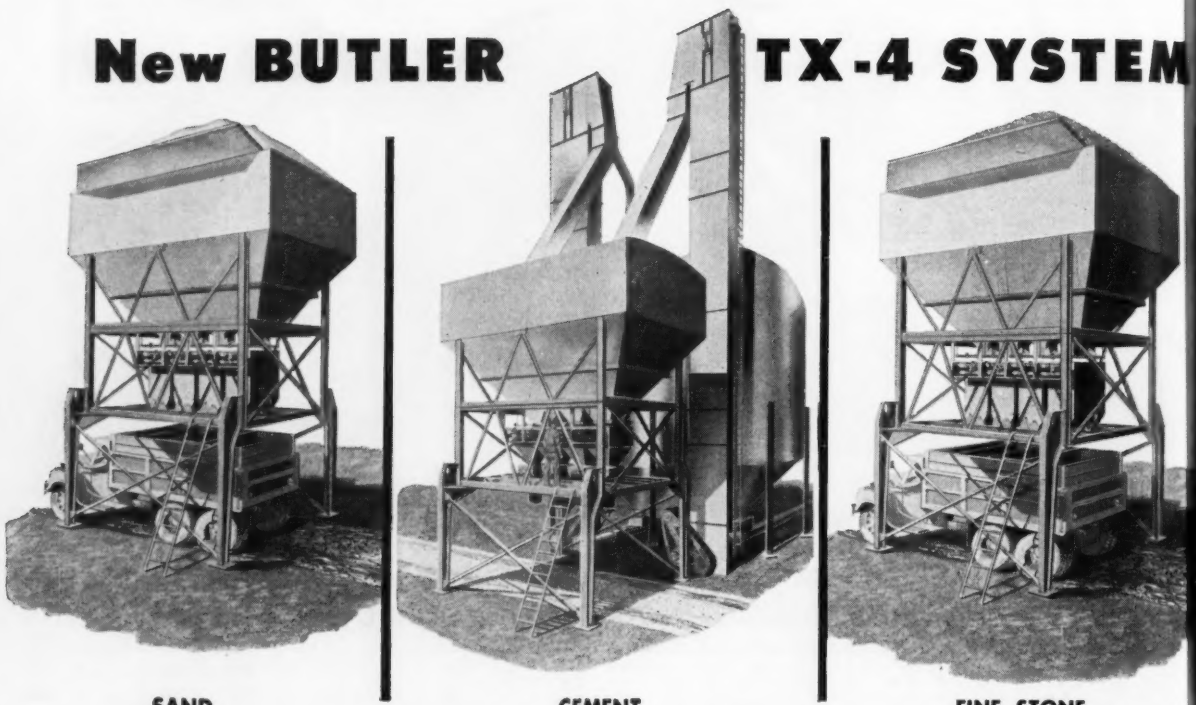
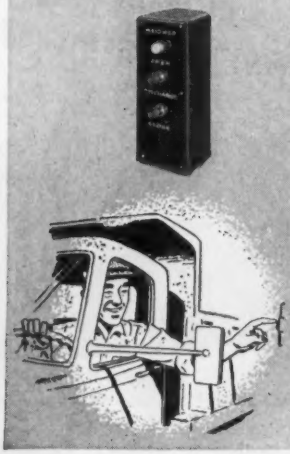
HANDLES 4

New BUTLER TX-4 SYSTEM



SAND CEMENT FINE STONE

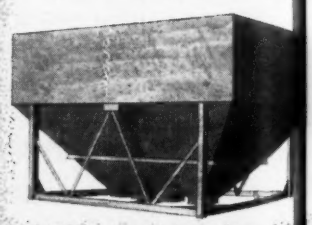
Designed for ULTRA HIGH SPEED BATCHING—for Four Pavers and wi



Batchers are pre-set for any specification and controls are mounted on aggregate bins so that batching is controlled automatically and discharge handled by the truck driver as he passes under the bins. All push button controls for all plants can be operated by the single batcher man located on the cement platform. Interlocking is built into the system so no set of batchers can be discharged until proper weights are reached, and no batchers can be filled until all materials are completely discharged.

Maximum Portability in Roa

The new BUTLER TX-4 Batching System has many built-in features that assure easier erection, dismantling and moving. Designed with a minimum of units, pre-assembled, they require only simple bolting in the field, and piping or wiring. Bin sections are shipped in one piece, batcher sections shipped with wiring and piping attached. All wiring and piping in the field are done with special quick connectors. And the TX-4 is the only road builders plant with generous clearance for trucks.



Bins are completely pre-assembled for easy crane handling with hinged columns.

PIONEERS IN **AUTOMATION** FOR READY MIX, ROAD BUILDERS AND CONCRETE PR

Operation

BATCHES SIMULTANEOUSLY

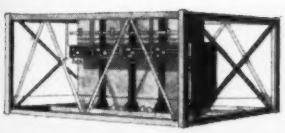
New BUTLER TX-4 Keeps Pace with FOUR 34E Dual Drum Pavers

Here's new engineered Automation so flexible, so fast, so dependable that it *obsoletes* all existing roadbuilders' plants. It's the new BUTLER TX-4 System, the modern batching plant that every contractor today *needs* to compete successfully. The contractor with only one paver starts with a TX-4 plant equipped with 2 batchers, and, as he expands with the road program, he simply adds additional batchers to the *same bins* to take care of 2, 3 or 4 pavers — and still retaining ONE-MAN OPERATION!

COARSE STONE

ONLY ONE OPERATOR

Builders Plant



Two or four-batcher units are shipped, handled, moved and stored with all piping and wiring in place.

How BUTLER TX-4 System fits Your Expansion Plans

THE BASIC UNIT

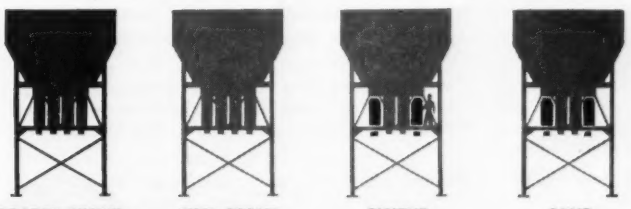
Handles one or two-batch trucks simultaneously

This Basic Plant, at minimum investment, provides facilities for batching for two-batch trucks — with one operator.

COARSE STONE FINE STONE CEMENT SAND

E-X-P-A-N-D-E-D UNIT

By merely adding extra batchers, at minimum extra cost, the Expanded Unit handles three or four pavers working at optimum production, charges 3- or 4-batch trucks

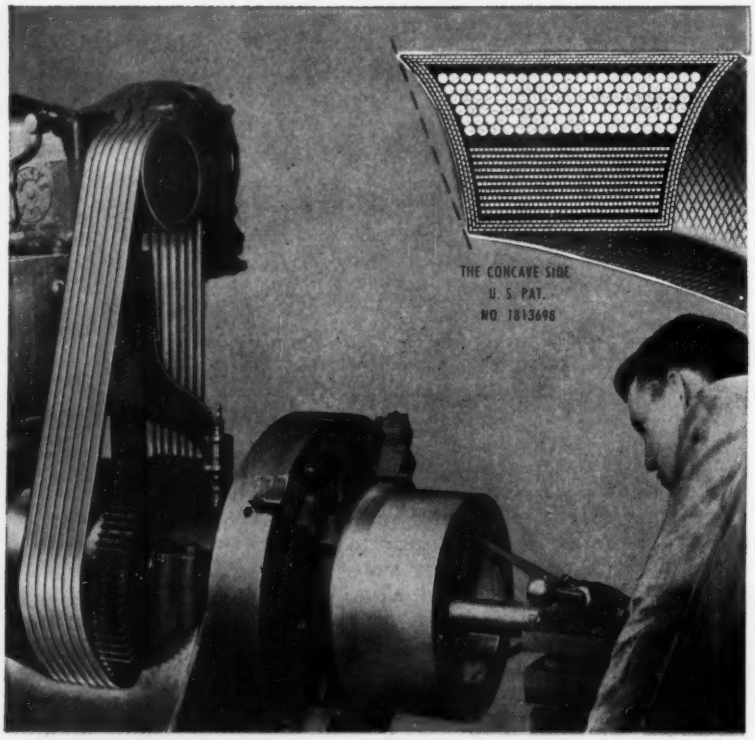


COARSE STONE FINE STONE CEMENT SAND

Write for FREE copy of this Bulletin giving complete details and specifications on every phase and feature of the new BUTLER TX-4 Road Building Systems.

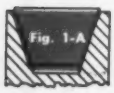
BUTLER BIN CO.

949 Blackstone Avenue
Waukesha, Wisconsin



WHY you get more service from V-Belts with concave sides

Each sidewall of a Gates V-belt is concave (Fig. 1) — a precisely engineered curve that makes V-belts last far longer.



HERE'S WHY: on the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave *evenly*.

This even contact distributes wear uniformly across the sides of the belt. Uniform wear lengthens belt life; keeps costs down.

MAKE THIS SIMPLE TEST

Bend a straight-sided belt (Fig. 2). The sides bulge at the bend causing uneven contact in the sheave groove (Fig. 2-A). Naturally, wear is greater at points indicated by arrows. Result: shorter belt life, increased belt costs.

To cut down-time and V-belt replacement costs, specify belts that grip evenly and wear longer. Specify Gates Vulco Rope — the V-belt with concave sides. The Gates Rubber Co., Denver, Colorado — *World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 109A

Gates

Gates Vulco Rope Drives

PRODUCING AGGREGATES . . .

continued from page 268

terial is greater than the horsepower required to convey the material on the level, including friction. If the conveyor rolls back, the material will pile up at the lower end with possible damage to the belt, and time will be lost in cleaning up the mess. On a short conveyor this may not be too serious. But on a long conveyor where the lift horsepower is considerably in excess of that for horizontal movement, a backstop is a must.

If a countershaft is used in the drive, the backstop should be mounted on it. When no countershaft is included (such as with gear motor or torque arm reducer drives) the backstop is mounted on the headshaft. The load rating of the backstop should be checked and one of suitable rating should be specified.

To determine load on, and size of, backstop needed, use the following formula:

$$\text{Ft-Lb of torque} = \frac{(\text{HPL} + \text{HPH}) \times 5{,}252}{\text{RPM of shaft on which mounted}}$$

Where: HPL is the hp to lift the load
HPH is the hp to carry the load on the level

Follow manufacturer's rating for backstop required.

The speed of the conveyor headshaft can be determined by reference to Table VII on page 274.

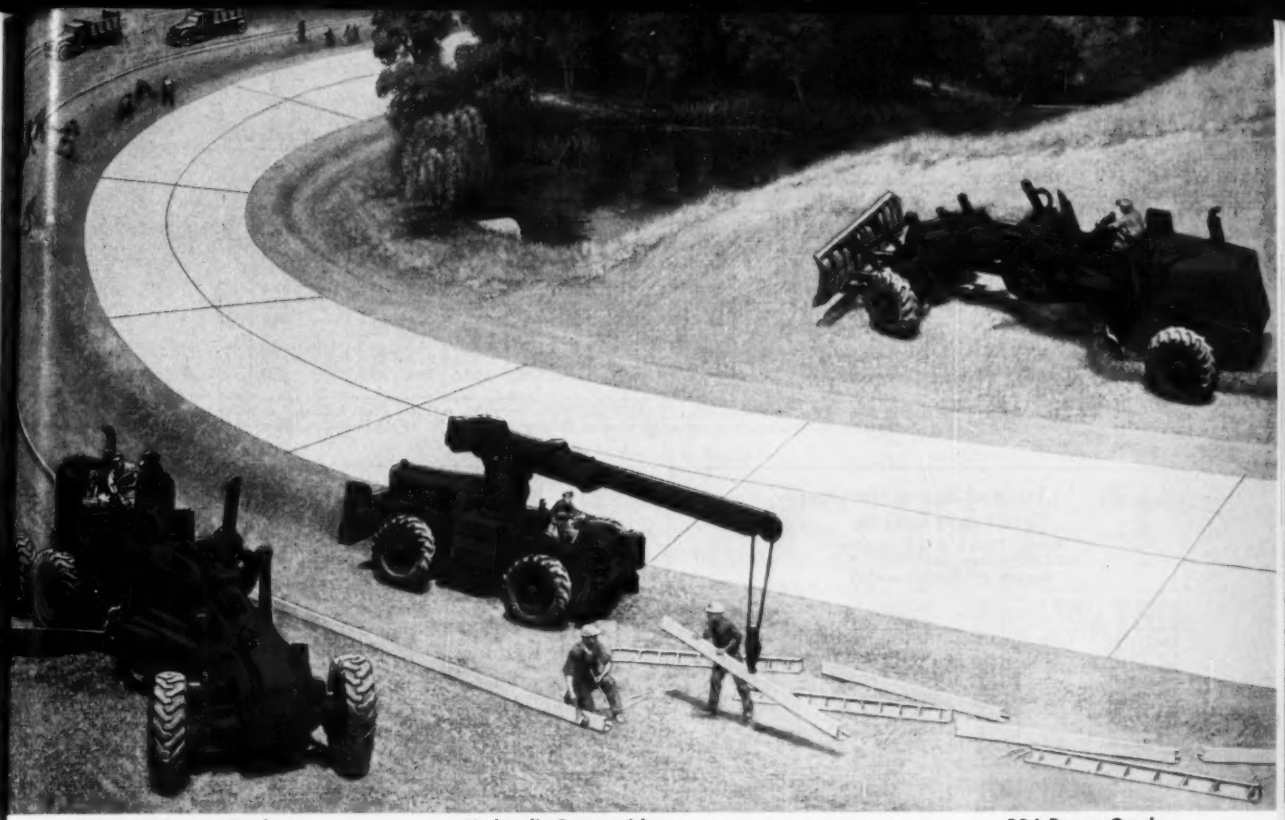
Loading Points, Transfer Spouts

It is always good practice to load a conveyor so that the material strikes the belt in the direction of travel. This makes for better distribution of material on the belt and for less belt wear and damage. A receiving hopper at the loading point is a must.

When material is to be delivered from a spout to a belt from one side, a transfer box should be built over the conveyor to facilitate proper delivery on to the belt. In like manner, when discharging from the end of a conveyor to a screen, for example, it is best to install a box or bang-board so material will fall onto the screen properly.

Conveyor Supports

Conveyor supports are of various shapes and descriptions. Locally made supports may be poles, pipes, or other handy material. When purchased, supports may be simple bents, A-frames, towers, or rock ladders. These are fabricated



Super 99 Power Grader—
6-wheel drive, 6-wheel steer

Hydraulic Crane with
live boom action

99-L Power Grader—
4-wheel drive, 4-wheel steer

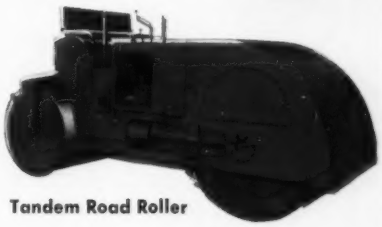
Here's why it will pay you to go AUSTIN-WESTERN in '57

The men who own and operate Austin-Western equipment will tell you that it's tops in its field. Graders, rollers, sweepers and hydraulic cranes all offer you more extra features than anything else in their class. That's why the A-W red is such a familiar sight on construction, maintenance and materials-handling jobs all over the world. Compare these advantages with those of any similar equipment, and you will see why it will pay you to go Austin-Western in 1957:

- **Power Graders**—Built to give 30% more power *at the blade* than ordinary graders. All-wheel drive, all-wheel steer . . . controlled traction . . . precision side-shift . . . high-lift blade (90° right or left) . . . extreme blade reach . . . completely reversible blade . . . finger-tip hydraulic controls.
- **Road Rollers**—3-wheeled, tandem and portable tandem models . . . variable weight, gas or diesel engines. Torque converter drive is smooth, powerful and flexible.
- **Street Sweepers**—Single or double gutter broom models, in 4-yard and 2-yard sizes . . . front steer for safety and maneuverability . . . rear dump for convenience.
- **Hydraulic Cranes**—The most versatile "arms" in industry, combining pickup, carrying and placement capabilities with the best features of crawler, truck and shop cranes. All movements of the live boom are actuated by fast, smooth hydraulic power. Two or more movements of the boom and cable are possible while the tractor is moving, and the angle can be quickly changed while operating under load. Available with a wide assortment of labor-saving attachments.

Find out more about the complete A-W line that's "Built to Outperform"—see your nearby distributor or write us for complete information.

3-wheel Road Roller



Tandem Road Roller

Street Sweeper

Power Graders • Motor Sweepers • Road Rollers • Hydraulic Cranes

BALDWIN · BLH · LIMA-HAMILTON

AUSTIN-WESTERN WORKS

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Construction Equipment Division

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AURORA, ILLINOIS, U.S.A.

TABLE VII — To Determine Speed of Conveyor Headshaft in RPM*

Find diameter of drum in left hand column and belt speed on top line, figure at intersection shows RPM of headshaft.

Drum Size (Inches)	BELT SPEED (Feet per Minute)															
	100	125	150	175	200	225	250	275	300	325	350	400	450	500	550	600
10	38.2	47.7	57.3	66.8	76.4	85.9	95.4	105.0	114.6	124.1	133.6	.....	.....	.....	.....	.....
12	31.8	39.8	47.7	55.7	63.6	71.6	79.5	87.5	95.4	103.4	111.4	.....	.....	.....	.....	.....
14	27.3	34.1	40.9	47.7	54.6	61.4	68.2	75.0	81.9	88.5	95.5	109.2	122.8	.....	.....	.....
18	21.2	26.5	31.8	37.1	42.4	47.7	53.8	58.3	63.6	68.8	74.2	84.8	95.4	.....	.....	.....
24	15.9	19.9	23.9	27.8	31.8	35.8	39.8	43.7	47.7	51.6	55.7	63.6	71.6	79.5	87.4	95.4
30	12.7	15.9	19.1	22.3	25.4	28.6	31.8	35.0	38.1	41.3	44.6	50.8	57.2	63.5	70.0	76.2
36	.....	.....	.....	18.6	21.2	23.9	26.5	29.2	31.8	34.5	37.7	42.4	47.8	53.0	58.4	63.6
42	.....	.....	.....	.....	.....	.....	22.8	25.0	27.3	29.6	31.8	36.3	40.9	45.4	50.0	54.5
48	.....	.....	.....	.....	.....	.....	.....	.....	.....	25.9	27.9	31.8	35.8	39.8	43.8	47.8
54	.....	.....	.....	.....	.....	.....	.....	.....	.....	22.9	24.8	28.3	31.8	35.4	38.9	42.5

*To determine belt speed in feet per minute when drum diameter and RPM are given, multiply drum diameter in inches x RPM x .262 (Constant). Example: What is conveyor belt speed when an 18" drum turns at 53 RPM? 18 x 53 x .262 = 250 feet per min.

TABLE VIII — Inclined Bucket Elevators—Continuous Buckets

Buckets Filled to 80% of Capacity
100 Lb. Material—Speed: 175 Ft. P.M.

Buckets 12" Centers on Belt

Bucket Size (Inches)	Tons per Hour	Belt Width	Maximum Lumps		H.P. Req. per 10' of Height
			Uniform	With Fines	
10x 7x11⅝	75	12"	2"	3"	1.1
12x 7x11⅝	90	14"	2"	3"	1.5
14x 7x11⅝	105	16"	2"	3"	1.7
16x 7x11⅝	120	18"	2"	3"	2.0
16x 8x11⅝	135	18"	2½"	4"	2.2
18x 8x11⅝	150	20"	2½"	4"	2.4
20x 8x11⅝	170	22"	2½"	4"	2.7
22x 8x11⅝	190	24"	2½"	4"	3.0
24x 8x11⅝	205	26"	2½"	4"	3.2
26x 8x11⅝	220	28"	2½"	4"	3.5
28x 8x11⅝	235	30"	2½"	4"	3.8
22x10x11⅝	250	24"	3"	5"	4.1
24x10x11⅝	275	26"	3"	5"	4.4
26x10x11⅝	300	28"	3"	5"	4.9
28x10x11⅝	325	30"	3"	5"	5.4

Buckets 12" Centers on Chain

Bucket Size (Inches)	Tons per Hour	No. of Chain Strands	Maximum Lumps		H.P. Req. per 10' of Height
			Uniform	With Fines	
10x 7x11⅝	75	Single	2"	3"	1.1
12x 7x11⅝	90	Single	2"	3"	1.5
14x 7x11⅝	105	Single	2"	3"	1.7
14x 8x11⅝	120	Single	2½"	4"	2.0
18x 7x11⅝	130	Double	2"	3"	2.2
18x 8x11⅝	150	Double	2½"	4"	2.4
20x 8x11⅝	170	Double	2½"	4"	2.7
22x 8x11⅝	190	Double	2½"	4"	3.0

Vertical Bucket Elevators—Spaced Buckets

Buckets Filled to 80% of Capacity
100 Lb. Material—Speed: 175 Ft. P.M.

Buckets 16" Centers on Belt

Bucket Size (Inches)	Tons per Hour	Belt Width	Maximum Lumps		H.P. Req. per 10' of Height
			Uniform	With Fines	
10x 7x11⅝	46	12"	1½"	2½"	.9
12x 7x11⅝	54	14"	1½"	2½"	1.1
14x 7x11⅝	62	16"	1½"	2½"	1.2
14x 8x11⅝	79	16"	2"	3"	1.4
16x 8x11⅝	90	18"	2"	3"	1.6
16x 9x11⅝	105	18"	2½"	3¼"	1.8
16x10x11⅝	120	18"	2½"	3½"	2.0

Buckets 16" Centers on Chain

Bucket Size (Inches)	Tons per Hour	No. of Chain Strands	Maximum Lumps		H.P. Req. per 10' of Height
			Uniform	With Fines	
10x 7x11⅝	46	Single	1½"	2½"	.9
12x 7x11⅝	54	Single	1½"	2½"	1.1
14x 7x11⅝	62	Single	1½"	2½"	1.2
14x 8x11⅝	79	Single	2"	3"	1.4
16x 8x11⅝	90	Single	2"	3"	1.6
16x 9x11⅝	105	Single	2¼"	3¼"	1.8
16x10x11⅝	120	Single	2½"	3½"	2.0

TABLE IX — Height of Conveyor at Various Angles

(Horizontal Projection of Center to Center Distance)

Angle of Incline (Degrees)	LENGTH (Feet)																				
	10	20	30	40	50	60	70	80	90	100	120	140	160	180	200	225	250	275	300	350	400	450	500	600	700	800	900	1000
2	.....	.....	.....	.....	2	2	2	3	3	4	4	5	6	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	4	4	5	6	6	7	8	10	11	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	.....	2	3	3	5	6	7	8	10	11	13	15	17	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	.....	3	4	6	7	8	10	11	13	14	17	20	22	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	.....	4	5	7	9	11	12	14	16	18	21	25	28	31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	.....	5	6	9	11	13	15	17	19	21	25	30	34	38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	3	6	7	10	12	15	17	20	22	25	30	35	40	45	200	225	250	275	300	350	400	450	500	600	700	800	900	1000
16	3	6	9	11	14	17	19	23	26	29	34	40	46	52	227	254	284	311	341	398	455	511	568	682	795	909	1023	1136
18	4	6	9	11	14	17	20	23	26	29	34	40	45	52	254	284	318	348	382	445	509	573	636	764	891	1018	1145	1273
20	4	7	9	12	15	18	21	24	28	32	39	45	52	58	284	318	355	389	426	497	568	639	710	852	994	1136	1278	1420
22	4	8	10	13	16	19	23	26	29	33	43	50	58	65	312	350	390	428	468	546	625	703	781	937	1093	1250	1406	1562
24	4	8	11	13	17	21	25	28	32	36	48	55	64	71	341	384	426	469	511	597	682	767	852	1023	1193	1364	1534	1705
26	5	9	12	15	18	23	27	31	35	40	52	60	69	78	369	415	461	507	553	645	738	830	923	1107	1291	1476	1660	1845
28	5	9	13	17	20	25	29	34	38	43	56	65	74	84	398	447	497	546	596	695	795	894	994	1193	1392	1591	1790	1988
30	5	10	14	18	22	27	31	36	41	47	60	70	80	90	426	480	533	587	639	746	852	959	1065	1278	1491	1705	1918	2131

TABLE X — To Determine the Length of Belt in Roll

Measure S in inches from the outside of the roll to the opposite side of the center opening of the belt. Count the number of layers or turns of belt. Solve the following equation in which—

S = Measured distance in inches
N = Number of turns of belt
C = .2618—constant
L = *Length of belt* in feet

The equation:
L = NS × .2618

Example: S = 20" and there are 40 laps of belt in the roll.
L = 20 × 40 × .2618 = 209.44 Ft.

PRODUCING AGGREGATES . . .
continued

generally from angles adequately braced for columnar effect and for lateral strength.

A rock tower is usually the strongest type of support. It is suitable for service when stock piles are built around it, and may be equipped with baffles in the form of shelves which "walk" the dis-

WHY leading machinery haulers prefer this 24-ton LaCrosse low-bed!

Owner records prove that this 24-ton capacity LaCrosse Model DF6T trailer *will haul a greater variety of loads within legal limits imposed by state laws* than any other low-bed on the market. This is because the DF6T weighs up to 2000 lbs. less than other similarly-rated low-beds . . . distributes the load better on specially-built *tandem*-axles . . . provides a bigger factor of safety, due to its conservative 20 MPH rating. In addition, the DF6T gives you *many exclusive structural features*, developed through 92 years of heavy-duty fabricating experience, and proved by millions of miles of tough highway hauling. Your LaCrosse distributor will gladly give you full information in terms of your specific hauling needs. Call him today, or write —

LACROSSE TRAILER CORPORATION

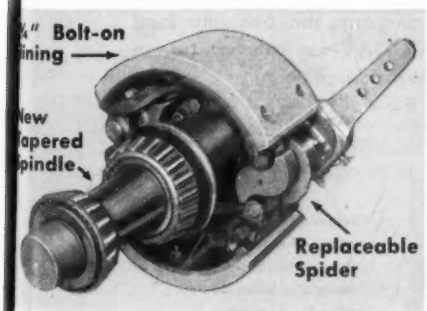
LaCrosse, Wisconsin, U.S.A.

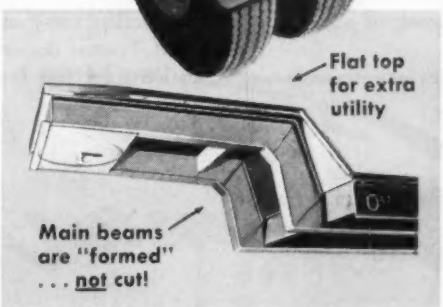
Heavy metal fabrication since 1865

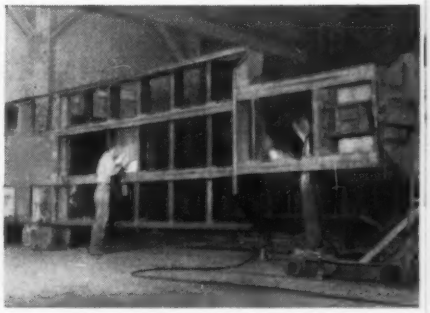
24-ton Model DF6T weighs only 8800 lbs. with flat deck — 9000 lbs. with drop platform

Other LaCrosse models from 6 to 75-ton capacity — with flat, drop or tilting platforms

LC-41







Bigger, safer brakes

The LaCrosse DF6T gives you up to 52 sq. in. more braking surface than any other low-bed on 15" wheels. This, together with LaCrosse's exclusive S-cam design and tough ¾" bolt-on linings, insures quicker, safer stops, plus up to 45% *longer lining life.*

Patented gooseneck construction

Patented LaCrosse method of forming trailer main-beams — without cutting either flange — provides *continuous unitized strength* from front to rear. It also gives far greater strength in the gooseneck where most of the jolting strains occur in trailer operation.

100% down-welded main-frame

Heavy-duty main-frame is *stress-engineered* to provide maximum strength with minimum weight. In addition, giant frame-positioners revolve under-structure during assembly, so all welding is done in a down-ward position, to insure *uniformly perfect welds.*

Sherman Power Digger Digs Six to Eight 60 Foot Trenches, 7 Feet Deep, in a Single Day!

Five Sherman Power Diggers, averaging 40 hours of work each, every week, are doing more than their share to maintain the position of Bell Plumbing and Heating Co., Denver, as one of the nation's major contractors.

As Mr. William Stecher, plumbing superintendent for Bell, puts it, "We have found that this equipment can dig six to eight sixty-foot ditches a day. All of them are seven feet deep. I would guess that each machine does the work of six men at about one half the price."

In addition to digging trenches for water and sewer lines, the Shermans are used for a variety of other digging and trenching jobs about the building sites.

With their Shermans on the job, Bell Plumbing and Heating no longer has to sub-contract normal digging jobs. Before purchasing the units, schedules often had to be adjusted for the sub-contractor and delays of several days were not uncommon. Now, work is completed on schedule.

Sherman Power Diggers can cut costs and speed production for your company, too. See your local Ford Tractor dealer TODAY for a demonstration or write for free Bulletin No. 850

See the Sherman Power Digger soon at your local **FORD TRACTOR DEALER**

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN
POWER DIGGERS* • FRONT END LOADERS • FORK LIFTS
Sherman SP Products

*Designed, Engineered and Manufactured jointly by Sherman Products, Inc., Royal Oak, Michigan. Wain-Roy Corporation, Hubbardston, Mass.

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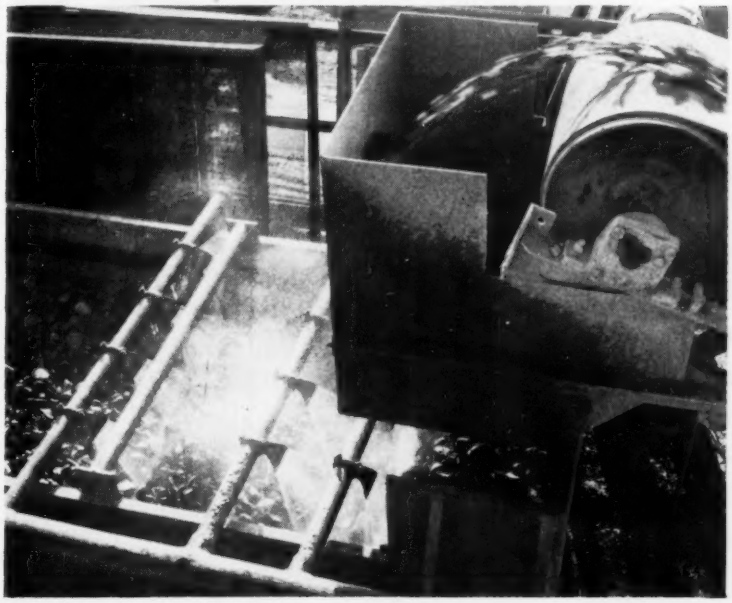


FAST-MOVING BELT CONVEYORS have considerable "throw" and should be fitted with box or bang-board so discharged material falls on to screen properly.

charged material down to the pile to prevent degradation and unnecessary fragmentation of the crushed material. Rock ladders are installed to support the conveyor headsection so that the material falls within the ladder. When desired, a tilt spout can be attached to divert the discharged material away from the ladder.

Support towers are usually made with four legs. Some types are suitable for use in stockpiles while other types may not have sufficient lateral bracing and should therefore be used only as intermediate supports. If purchased, support towers should be checked to make sure they meet the intended service requirements.

A-frames and bents are designed for use as intermediate supports. Vertical gravity belt tighteners frequently have support legs 15 or 20 ft high, and when so designed may be used as intermediate supports. Where it is desired to provide considerable discharge-end overhang, cantilever supports are available.

Conveyor Drives

When conveyors form part of a plant, either portable or stationary, they may, if properly designed, be driven by power applied to the tail pulley. This method is not recommended for the ordinary conveyor as the load is in effect "pushed" up the incline rather than pulled. It is always better to drive the head pulley, to avoid belt slippage and to assure proper tension in the belt for maximum efficiency.

V-belt drives to countershafts and gears have for some time been popular. Gear motors with a chain drive to the head sprocket are sometimes used, but the overhang of the motor is objectionable. Now it is considered good practice to install a torque-arm reducer on the headshaft and to drive the reducer by electric motor and V-belt. In areas where electric power is not available and no means for generating it at the plant is provided, the gasoline engine with either a flat belt drive or shafting and angle type gear boxes is accepted as the motivating power.

Bucket Elevators

Bucket elevators may be inclined or vertical, open style or totally enclosed. Buckets may be attached to chains or heavy duty conveyor belting. Over many years standards have been adopted for shape and dimensions of buckets.

Since the use of bucket elevators is quite limited in the production of aggregates, it is not intended to give much description of them at this point. The manufacturers of bucket elevators are in position to furnish rather complete data on the types available. Table VIII (page 274) gives material carrying capacities of bucket elevators.

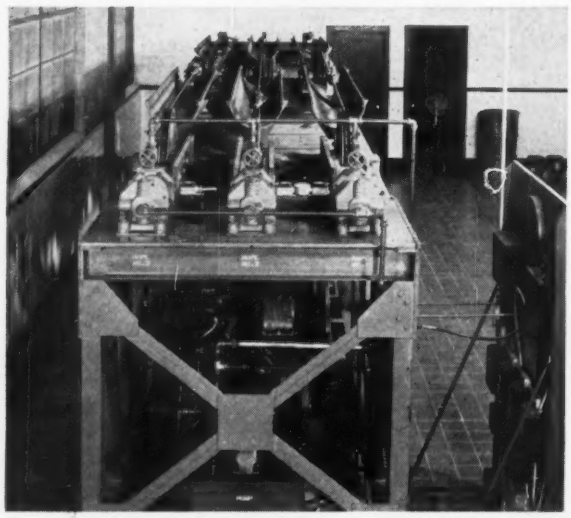
Selecting Conveyor

The producer or contractor contemplating the installation of a conveyor may find it helpful to use the following procedure for arriving at his selection:

1. Determine the maximum tonnage per hour the conveyor must handle and select a belt width adequate, taking into consideration the permissible lump size. (Table III)
2. Determine the length of conveyor required on the incline, keeping in mind the maximum angle for the material involved, usually 18 deg for gravel and rock. (Table, page 260 and chart, page 267)
3. Determine the horizontal distance and lift (see chart) and determine the horsepower. (Tables V and VI)
4. Specify the terminal equipment corresponding to the horsepower requirements.
5. Determine the number of troughing and return idlers by use of the formulas. (Page 256). Specify the type of idlers desired.
6. Determine the type of conveyor frame desired. Be sure to include some suitable type of receiving hopper.
7. Determine the length of belt required and specify the quality of belt to be furnished. (Page 266)
8. Include auxiliary items such as belt tightener, back stop, etc.
9. Indicate how conveyor is to be driven and by what means.
10. Be sure adequate attention is given to the method of supporting the conveyor. (Page 267)

The seventh article on Producing Aggregates will appear in our February issue and will discuss stationary plants.

Tuffy® Wire Rope Tips



Until recently, a relatively meager amount of factual data has been available for estimating life expectancy of wire rope. Predicting how much service life could be expected from a given wire rope construction under a given set of operating conditions was largely a matter of guess-work, trial-and-error and generally inexact calculations.

Since bending stresses are a major factor in wire rope life, Union Wire Rope engineers designed the Accelerated Fatigue Tester, shown above, with which to pin down the effects of bending on wire rope. Now, from a long and exhaustive series of bending tests, scientific data has been accumulated and organized to take the place of former rule-of-thumb methods.

The data established by this laboratory research is based on the effect of various sheave diameters on bending stresses of various constructions of wire rope.

From test data, bending-life curves have been plotted by Union Wire Rope engineers for each of the more widely used rope constructions. Analysis made on each of these curves showed them to follow a pattern expressed by the curve shown in Fig. 1.

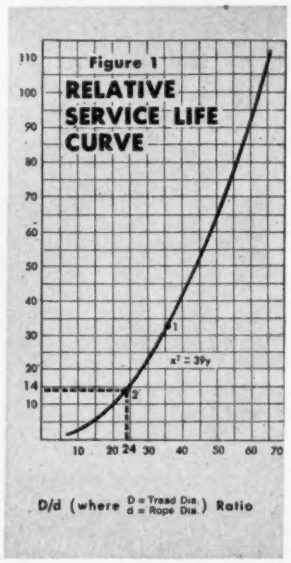


Table 2

BENDING-LIFE FACTORS

When Using Curve of 6x25 FW

CONSTRUCTION	FACTOR
6x7	0.57
18x7	0.67
6x17 Seale	0.73
6x19 Seale	0.80
6x21 Filler Wire	0.92
6x25 Filler Wire	1.00
6x31	1.00
8x19 Seale	1.14
6x37	1.33
8x19 Warrington	1.33
Tiller Rope	2.00

Table 3

SHEAVE DIAMETER FACTORS

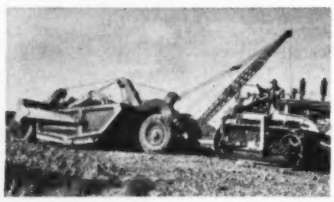
ROPE CONSTRUCTION	GENERAL PURPOSE RANGE D/d Ratios	Where D = Tread Dia. d = Rope Dia.
6x7	63	42
18x7	54	36
6x17 Seale	49	33
6x19 Seale	45	30
6x21 Filler Wire	39	26
6x25 Filler Wire	36	24
6x31	33	22
8x19 Seale	31	21
6x37	27	18
8x19 Warrington	27	18
Tiller Rope	18	12

Note on Fig. 1 the curve shows that as the ratio of tread diameter to rope diameter increases (see D/d figures at bottom of chart) the longer the relative service life as expressed by the figures at the left of the chart.

However, there are few pieces of equipment on which sheave and drum sizes can be large enough to afford D/d ratios above 50. From test data the general-purpose range of D/d ratios was determined. Those recommended are set up in Table 3.

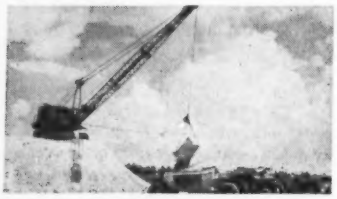
Spotted on the curve, for example, is the D/d ratio of 24 at point 1 and D/d ratio of 36 at point 2—these being the range for general purposes taken from Table 3 for the 6x25 filler

Tuffy Special Wire Ropes are tailored to special use. Ordering is easy



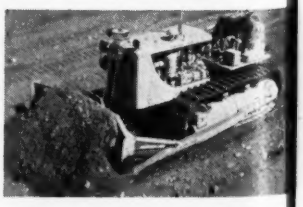
Tuffy Scraper Rope

Moves more yardage per foot because **Tuffy** Scraper Rope is specially built to take the beating of extreme drum-crushing abuse. Flexible; withstands sharp bending; hugs sheave grooves and winds snugly and smoothly on drums. High resistance to load shock on slack line.



Tuffy Dragline Rope

Longer-wearing line for all dragline operations. Special abrasion resisting construction which also gives extra flexibility. Tuffy Draglines also spool better, ride better on grooves and hold tightly to drums when casting. Consistently dependable in handling any material—wet or dry dirt, sand, gravel, rock, cement or minerals.



How to predetermine wire rope life

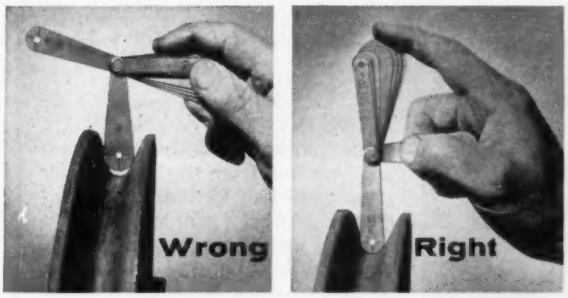
Here's the easier, surer way developed by Union Wire Rope Corporation Engineers

rope. Moving from these points to the left on the chart, the relative service life of this rope ranges from 14 to 34 units of any service measure used, such as yards, tons, days, etc.

Now to determine the relative service life of say a 6x37. Its bending life factor (see Table 2) is 1.33 as compared to 1.00 for the 6x25 filler wire. Multiply the service life readings of 14 and 25 for the 6x25 filler wire by 1.33, and we find the service life range of the 6x37 falls at 18 and 27 units of service. Relative service life of other ropes are determined in the same way by using the bending factor indicated for each as the multiplier.

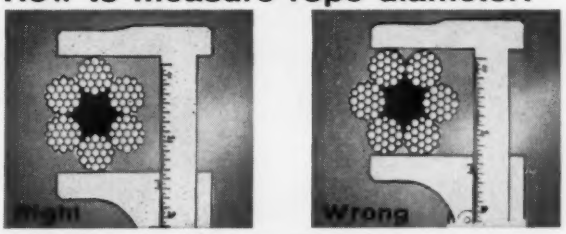
Of course bending is not the only wear factor in wire rope operation, and the general rule—that more flexible ropes should be used as bending stress increases with decrease in diameter of sheave or drum—has to be modified in field use. In fact there are eight other principal operating conditions, in addition to bending stresses, that affect wire rope service life. They are loading conditions, portability, corrosion, abrasion, rope speeds, materials handled, and equipment design.

What Size Rope?



Check groove diameter: When new wire rope is to be used on old equipment, make sure the tread or bearing surface of all sheaves is of sufficient groove diameter to avoid pinching the rope.

How to measure rope diameter:



Use a machinist's caliper. Be sure to measure the widest diameter.

How to measure tread diameter:

Select the smallest sheave or drum to be used with the new wire rope, and measure actual diameter of tread.

Sheaves with grooves corrugated with rope lay impression should be replaced with new ones before installing new wire rope.

New wire ropes are usually over-size. It is advisable to have groove diameters of sheaves or drums as large as the actual calipered diameter of the new rope, or slightly larger. We recommend sizes as follows:

Diameter of Rope	Groove Diameters	
	Minimum	Maximum
½" and smaller	diameter + 1/32"	diameter + 3/32"
9/16-1"	diameter + 1/16"	diameter + 1/8"
1-1/16-2"	diameter + 3/32"	diameter + 3/16"
Over 2"	diameter + 1/8"	diameter + 1/4"

Following the above instructions, you will know the Diameter of Wire Rope to use to fit your equipment.

Just say **Tuffy** give length and size, and forget complicated specifications.

Tuffy Slings and Hoist Lines

Here's a team that cuts hoisting and down-time costs in all types of materials handling.

Tuffy Slings are made of a patented, machine-braided fabric that stays extra flexible, and isn't materially damaged by knotting or kinking.

Tuffy Hoist Line is a special construction with the extra flexibility and toughness for longer service life on overhead, stiff leg and mobile cranes, derricks and clamshells.

Tuffy Dozer Rope

Long after ordinary ropes are worn out, **Tuffy** Dozer Rope has the stamina it takes to keep on handling the blade. 150' reels of 1/2" or 9/16" mounted on your dozers let you cut off worn sections without wasting good rope. This unbeatable combination piles up sizeable savings on dozer rope costs.

Your Tuffy Distributor is ready to help you with any wire rope problem.

If you aren't acquainted with him, look under "Wire Rope" or "Slings" in the classified pages of your telephone directory.

FREE! New "Rope Dope" Educational Bulletins

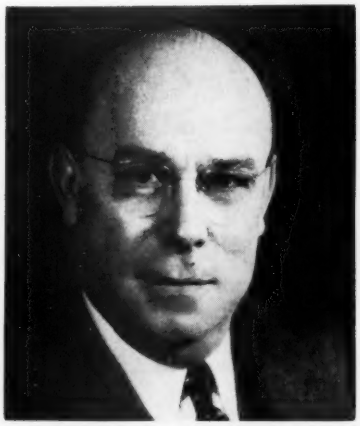
They're packed with boiled-down, useful information on the selection and care of wire rope for greatest service. Just ask your Tuffy Distributor to put your name on his mailing list.

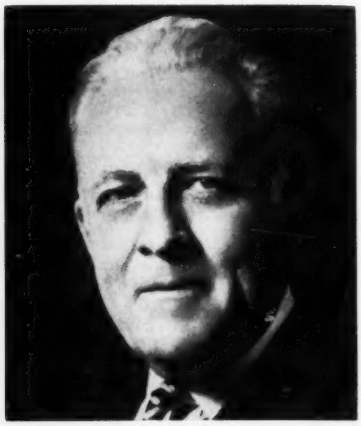
union Wire Rope corp.

2270 Manchester Avenue, Kansas City 26, Mo.

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

Construction Men in the News . . .





Fuller Elects New Top Officers

RAYMOND C. DALY (left) is newly elected president of the George A. Fuller Co., New York, Venezuela, and Puerto Rico general contractors. He succeeds **LOU R. CRANDALL** (center) who becomes chairman of the board. **WALTER BEINECKE, JR.**, succeeds his father who resigned his post as a director.

Daly joined the Fuller organization in 1930, became a vice president in 1953, and a director in 1954. During his directorship he served as assistant to the president. Crandall came with the company in 1917 and became its president in 1928.

FRANCIS V. DuPONT, former U. S. Commissioner of Public Roads, has become associated with two consulting engineering firms.

They are Parsons, Brinckerhoff, Hall, and Macdonald of New York, and Lockwood, Kessler, and Bartlett, Inc. of Syosset, N. Y. For 23 years prior to becoming the nation's top roads man he was chairman of the Delaware State Highway Commission where, under his direction, the system of divided highways was developed. In 1948 he received the "Citation of Distinction" of the AASHO.

C. C. WHITTELSEY is the new president of Ford, Bacon & Davis, Inc., New York engineers and constructors, and its subsidiaries Ford, Bacon & Davis Construction Corp. and Ford, Bacon & Davis Canada, Ltd. He succeeds E. S. Coldwell who continues as chairman of the board. Whittelsey formerly was executive vice president.

He was in charge of engineering and construction of such jobs as the ammonia, methanol, and nitroparaffin plants of Commercial Solvents, Sterlington, La., the natural gas pipe-line system of Louisiana Pipe Co. that extends from the Louisiana Gulf Coast to Detroit, Mich., and the placing of a natural gas pipe line from the Peace River area of British Columbia to Vancouver.

Born in Birmingham, Ala., he attended Washington University in St. Louis and the Missouri School of Mines. He has been with the firm since 1926.

THOMAS J. GRASSO and **SAMUEL C. FLORMAN** are new directors of the Kreisler-Borg Construction Co., White Plains, N. Y.

Grasso, a vice president and superintendent, came to K-B after 17 years of association with such New York firms as Psaty & Fuhrman, Knickerbocker Concrete Arch Co., and J. Rich Steers Co. His work includes all types of public works, commercial and industrial projects, and heavy construction.

Florman, along with being named a director, also becomes vice president and project manager for the firm. He formerly was with Joseph P. Blitz, Inc., as project manager-estimator. Kreisler-Borg engages primarily in the construction of buildings.

WHOLE FLOOR OF BUILDING has been pulled loose by this crane of John J. Duane Company. To do it, workmen drove two holes in the floor (walls and roof had already been removed) and inserted cable down through holes and up to crane. Crane then tugged until floor ripped loose. This is typical of workout the firm's cranes receive, but using Cities Service lubricants they give flawless performance.

Razes buildings, raises efficiency using Cities Service lubricants

9000 hours on a crane and no trouble . . . truck goes 65,000 miles, uses no make-up oil!

JOHN J. DUANE COMPANY, Quincy, Massachusetts, operates 10 cranes, 14 gasolene and diesel trucks, three forklifts, and a bulldozer . . . all powered and lubricated by Cities Service. The results are notable. Says John Duane: "Using Cities Service C-300 Motor Oil, one of our diesel cranes has gone 9000 hours with absolutely no trouble, and the oil has doubled the period between overhaul for our truck fleet. Furthermore, one gasolene truck has gone 65,000 miles without adding a drop of C-300 between crankcase drains. We're also mighty pleased with Trojan P-2 Grease. Used on the tracks of our cranes, Trojan P-2 keeps them operating flawlessly under the most severe conditions."

Like Mr. Duane, you'll lengthen overhaul periods, cut operating costs when you start using Cities Service products. Get all the facts from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

C&D Movall-- Lets You Dump or Spread the Way You Want

FEEDS LIMESTONE INTO HOPPER at controlled rate for Cia. Peruna de Cemento Portland, Atacongo, Peru. Operator controls discharge rate from tractor seat, stops ejector when 8-yard crusher is full. Here two 25-yard Movalls, powered by Cat DW20 tractors, replace six 8-yard side-dump trucks.

SPREADS PERVIOUS FILL IN 18" LIFTS at Santa Felicia Dam in California. Movall dumps behind wagon tires, safely at any speed tractor can travel because dozer-type ejector keeps center of gravity low. Depth of spread is uniform, controlled by speed of tractor (4" at 20 mph., 18" at 3 mph.). Movalls also can dump while turning at end of road fill, thus retaining fines on top.

DUMPS OVER EDGE OF FILL with tractor either straight ahead or jackknifed. Drive wheels are always on good footing; center of gravity stays low. Positive ejection with 140,000-lb. push enables Orlando Construction Co., to dump 25-yard load of rock and dirt in 12-14 seconds on Massachusetts Turnpike. Movalls dump cleanly and quickly any material you can top load.

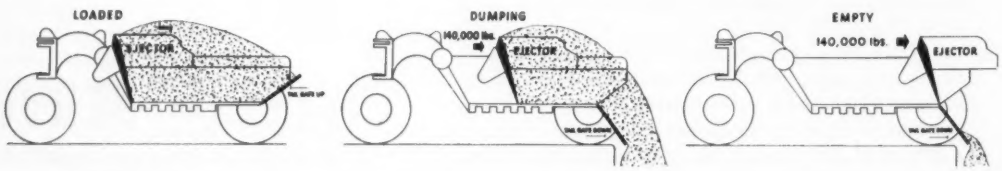
DUMPS ON GRADE safely from any position or on any level. Load is pushed straight back by 140,000-lb. push of dozer-type ejector. There's no raising of load, no danger of wagon tipping or damaging mechanism. Frozen earth and rock being dumped here on St. Lawrence Seaway by C. A. Pitts, Ltd., was loaded by 6-yard shovel.

Movalls are available for all rubber-tired tractors—Allis-Chalmers, Caterpillar, Euclid, International, LeTourneau, M-R-S, and Wooldridge. Sizes: 12 to 26½ cu. yds. struck, 22 to 45 tons rated load.

Buy Movalls where you buy your tractor... ask for a demonstration on our buy-and-try plan. C & D Division, Yuba Manufacturing Co., 701 East H St., Benicia, Calif. Phone 628.

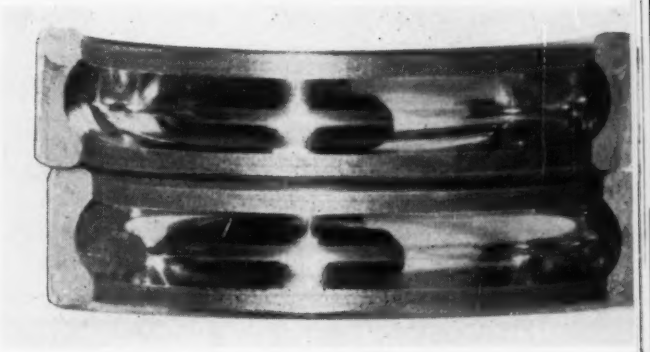
9-R

HOW IT WORKS



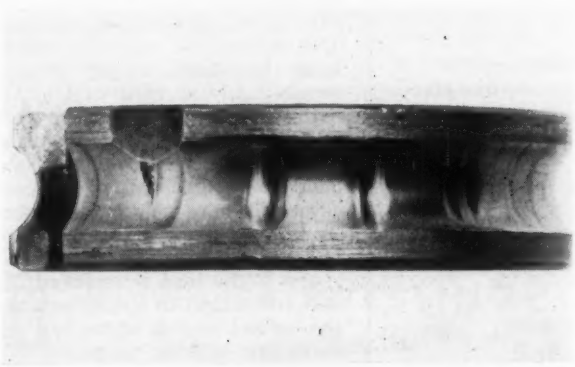
Bearings Show Why They Failed

Visually inspect broken bearings before replacing them with new ones. The Marlin-Rockwell Corp. points out that each cause of bearing damage leaves its own identifiable trade mark. If these are interpreted correctly, you can eliminate trouble spots and new bearings will do a more effective job, give longer service.



CORROSION — Small etched holes over the exposed surface of the raceways indicate that corrosive elements are damaging this bearing. Corrosion is almost always accompanied with a reddish brown coating over the exposed section of the race and by a dull gray coloring on the balls and the ball path. Frequently the etching will be missing from the ball path because the rolling action of the balls squeezes out the lubricant—carrying the corrosive element—and oxidation takes place on other parts. This oxidation causes wear on the balls and in the ball path. The cutaway above indicates that the bearing is in good working order: little metal has been lost; the ball paths are uniform.

OVERLOADING—Fatigue failures on the surfaces of the raceways are generally the direct and easily identifiable result of overloading of the bearing. These failures start in a small area on the inner race, and if not detected they spread rapidly over both races and the ball surfaces. Another indication of overloading is a widened ball path and distorted balls. The symptoms of overloading differ markedly from those caused by corrosion, false brinelling, or foreign matter that gets in the race; corrosion causes etching and discoloring; coarse foreign matter in the races causes rounded depressions that spread rapidly; and overloading results in holes with sharp, jagged edges.



FALSE BRINELLING—This occurs when a bearing fails to rotate properly for extended periods. False brinelling shows up as depressions in the race under each ball. Even though the bearing load may be light, changes in the surface of the race results from the slightest axial or rotational movement of the balls. The extreme example of false brinelling shown at the left was caused by abrasive foreign matter that was introduced into the race while the bearing was experiencing vibration without rotation. This bearing was exposed to air that oxidized the microscopic metal particles freed by vibration, causing further damage.

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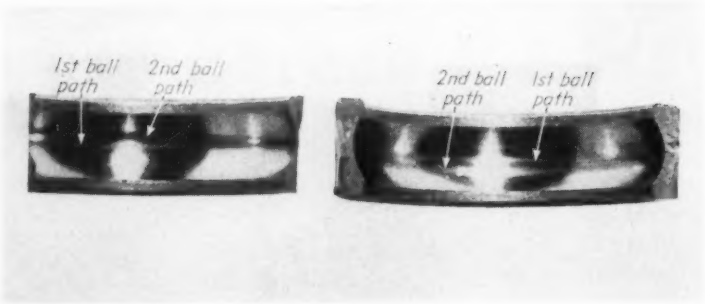
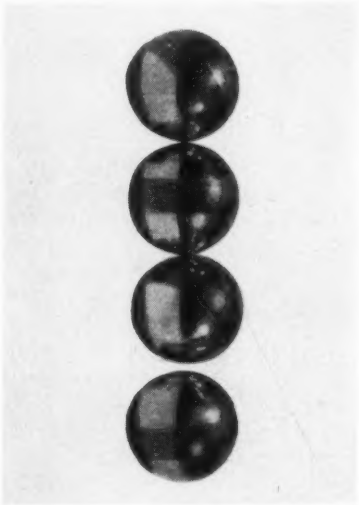
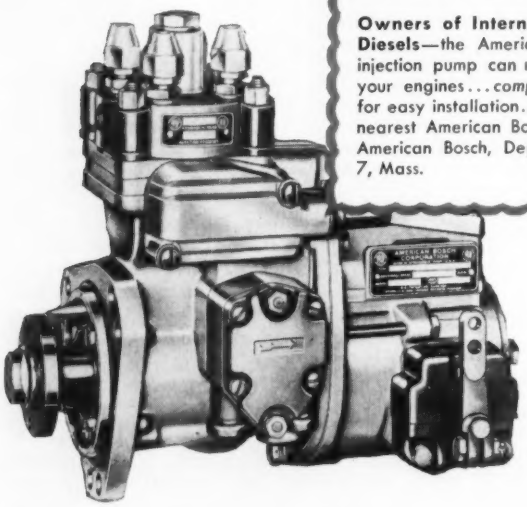


MISALIGNMENT—Almost all separator or retainer failures in a single-row ball bearing can be traced directly to an off-square misalignment. This means that either the bearing housing or the housing shoulder have tilted out of position. This causes a variation in ball speed that causes the balls to jam into the separator pockets. One indication of off-square misalignment is when the ball pockets in the retainer are gouged out. Other signs are a retainer that becomes overheated quickly, and the presence of small steel or bronze chips in the lubricant. In the illustration to the left, only the retainer shows deterioration although the race is roughened by particles from the separator and the ball path is widened.



BALL FAILURE — If ball bearings have been working under good load conditions, and if they have been kept clean and lubricated, their entire surface will be uniformly dulled. The balls pictured above did not spin or change their axis of rotation in the raceways. This means that their life expectancy has been sharply reduced because only a small part of the ball surface has taken the work load. In time, they will lose metal and become distorted. This trouble results when a bearing has been subjected to a continuous thrust load large enough to keep the balls in contact with the raceways at all times. If the load is removed, the ball will travel in a new axis and the unused portion of the ball will make the bearing noisy.



Owners of International Harvester Diesels—the American Bosch PSB fuel injection pump can now be installed on your engines... *complete kits* available for easy installation... for details, contact nearest American Bosch dealer or write American Bosch, Dept. SSS, Springfield 7, Mass.

the PSB fuel injection pump

UNEXCELLED

... for performance and outstanding service—that's the acknowledged record of more than 100,000 American Bosch PSB pumps now in use.

Here's some reasons why! Simple construction... fewer parts... accurate fuel metering and distribution ... positive governor control ... replaceable hydraulic head for fast field servicing.

What's more—all American Bosch fuel injection products are backed by a growing system of authorized service agencies, fully equipped to provide quick, efficient repair service.

Unequaled value—for top diesel engine performance and economy of operation... long trouble-free life... lower maintenance expense—nothing equals a PSB fuel injection pump.

AMERICAN BOSCH

Division of
American Bosch Arma Corporation
Springfield 7, Mass., U. S. A.

4493

Loads truck every 45 seconds... 700 yards per hour

Fast, clean handling of dirt makes every yard cost less. With a fast-loading Elegrader mounted on your larger size Adams grader, you can cut earthmoving costs on jobs where large volume loading, casting, or ditching is required.

Makes your grader a loader

Elegrader cuts ditches and casts plowed material up on the road-bed, into trucks, or over the side bank. It loads fill, strips topsoil, works effectively in clay, loam, sand, gravel, or muck. A heavy-gauge disc-plow is mounted on sturdy plow-beam attached at front of grader. Plow is raised or lowered by power controls from operator's cab . . . digs to 30″ depth.

Loads or casts

Excavated material flows from disc-plow onto a trough-belt conveyor . . . travels up and off conveyor at speed of 450′ per minute. You can load up to 700 cubic yards per hour, depending on soil-conditions. 5-yard trucks can be loaded in 30 seconds with a 45-second loading-cycle. When loading a fleet of trucks, the conveyor height is adjusted to load the highest truck, and need not be changed for others.

For jobs such as building up a road grade, or wasting dirt to the side, Elegrader overcasts up to 1500 cu. yards per hour.

26 mph mobility

Your Elegrader, mounted on an Adams grader moves job-to-job at speeds to 26 mph. Conveyors 16′, 19′ or 22′ long are power folded and carried on grader when traveling . . . 27′ conveyor is towed behind grader on its own rubber-tired wheels.

Make cheap dirt pay

Get the facts on Elegrader for fast, clean, big-volume dirt-handling. Find out how a small investment can pay you big dividends. For complete information, just telephone us or drop us a line.

Check these Elegrader features

Troughing belt — 30% more carrying capacity than flat belt; makes steep-angle operation practical.

Hinged conveyor — power-operated folding conveyor; travels safely at traffic speed from job-to-job.

Extended lip and rock-guard — deflects foreign objects from striking belt and conveyor, prevents disc from cutting belt.

Extra-heavy plow-beam — sturdy, stable mount for disc-plow; balances carrier for smooth, easy operation.

Sealed bearings on conveyor-rollers — make lubrication unnecessary for life of bearings.

Belt guide-rollers — center conveyor-belt, reduce wear, cut power-loss, reduce belt-maintenance.

Practical sizes — Available for use on Adams grader models 660, 610, 550, and Cat model 12. Carrier length: 16′, 19′, 22′, 27′. Belt width: 42″.

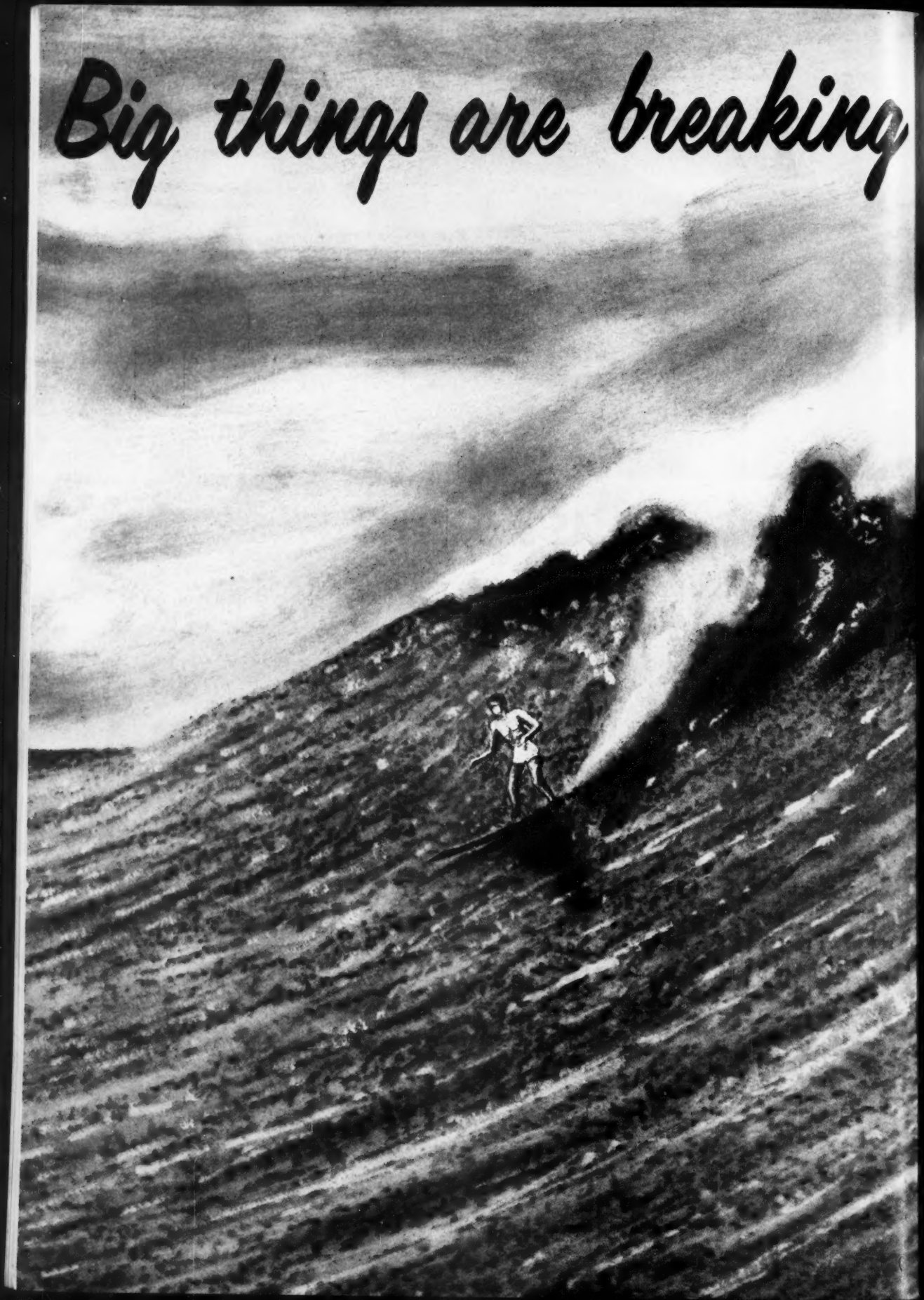
This Elegrader, mounted on Adams 660, cast 1000 yards an hour, rebuilt average of 1 mile of road per 14 hours.

Stripping 18″ deep at 2¼ mph, this Elegrader loaded trucks in 30 seconds, averaged 600 yards per hour. AE-37-H-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

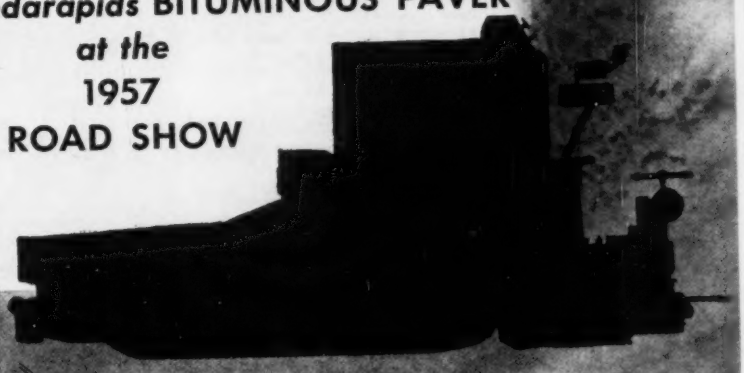
A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT


Big things are breaking a

at CEDARAPIDS!

See the new revolutionary
Cedarapids **BITUMINOUS PAVER**
at the
1957
ROAD SHOW



A.R.B.A. ROAD SHOW
Cedarapids
BOOTH 703

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U.S.A.

Schramm Truck Mounted Rotadrill drives right to the drill site—often where bigger rigs can't go. Drilling is a one-man operation; simply lower out-riggers, raise mast and attach drill pipe and bit.

CONTRACTORS TELL US:

"Faster than bigger rigs . . . goes where they can't"

You don't have to sacrifice drilling speed to gain maneuverability. With a Schramm Truck Mounted Rotadrill, you get both. Field tests prove that Rotadrill makes hole 600% to 700% faster than conventional drill rigs. Yet its relative lightness permits it to work where big rigs can't go—at the edge of a cliff, for example.

Reason is that there's nothing unwieldy about the Truck Mounted Rotadrill. It needs no ponderous machine to transport or power it—it's self-propelled. Also, it has no cumbersome superstructure to be erected and dismantled. Rotadrill's drilling speed comes from regulated hydraulic down pressure (up to 25,000 pounds) and immediate, continuous chip removal by compressed air. Because the kelly bar and rotation table are eliminated, the adding or removal of steels from the string takes less than 5 minutes.

Ease of transportation is built into Rotadrill. So is fast set-up. And because Rotadrill cleans the hole continuously with compressed air, bit life is prolonged. Bulletin TMR-55 gives complete details of the Schramm Truck Mounted Rotadrill. Be sure to write for your free copy—along with our Bulletin, "Rotary Rock Drilling with Schramm Air Compressors." It's a mine of drilling information.

Your local Schramm Dealer is listed in the Yellow Pages of your telephone directory.

Oversize truck engine (450 cu. in.) drives 4½" x 4¾" x 6 cylinder Schramm Compressor through power take-off. Compressor delivers 320 cfm at 40 psi. This can be instantly increased to 200 psi for dewatering and breaking out blockages.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

604 North Garfield Ave. West Chester, Pa.

ROAD SHOW PREVIEW . . .
Continued

Tractomotive

THE TL-20 Tracto-Loader, a new 2-yd front-end wheel loader, will make its debut at the Tractomotive Road Show exhibit. The loader is a heavy-duty unit featuring a power-shift transmission with torque converter drive, planetary axles, and four-wheel brakes.

Power is provided by an Allis Chalmers diesel that develops 95½-hp at 2000 rpm. The rig has three speeds in both forward and reverse with a top speed of 23 mph. The 2-yd bucket features 40 deg tip-back at ground level and a 9-ft dumping clearance.

Other features include a one-piece welded frame, a 24-v electrical system, and a fully enclosed hydraulic system that includes a full-flow filter as well as a magnetic filter and a suction line screen.

Quick-Way

TO FILL OUT its line of small shovel-cranes, the Quick-Way Truck Shovel Co. will unveil three new units at the Road Show. They are a 5/10-yd crawler-mounted machine called the 105AC and a crawler-mounted and truck-mounted version of a new 4/10-yd machine called the 85A.

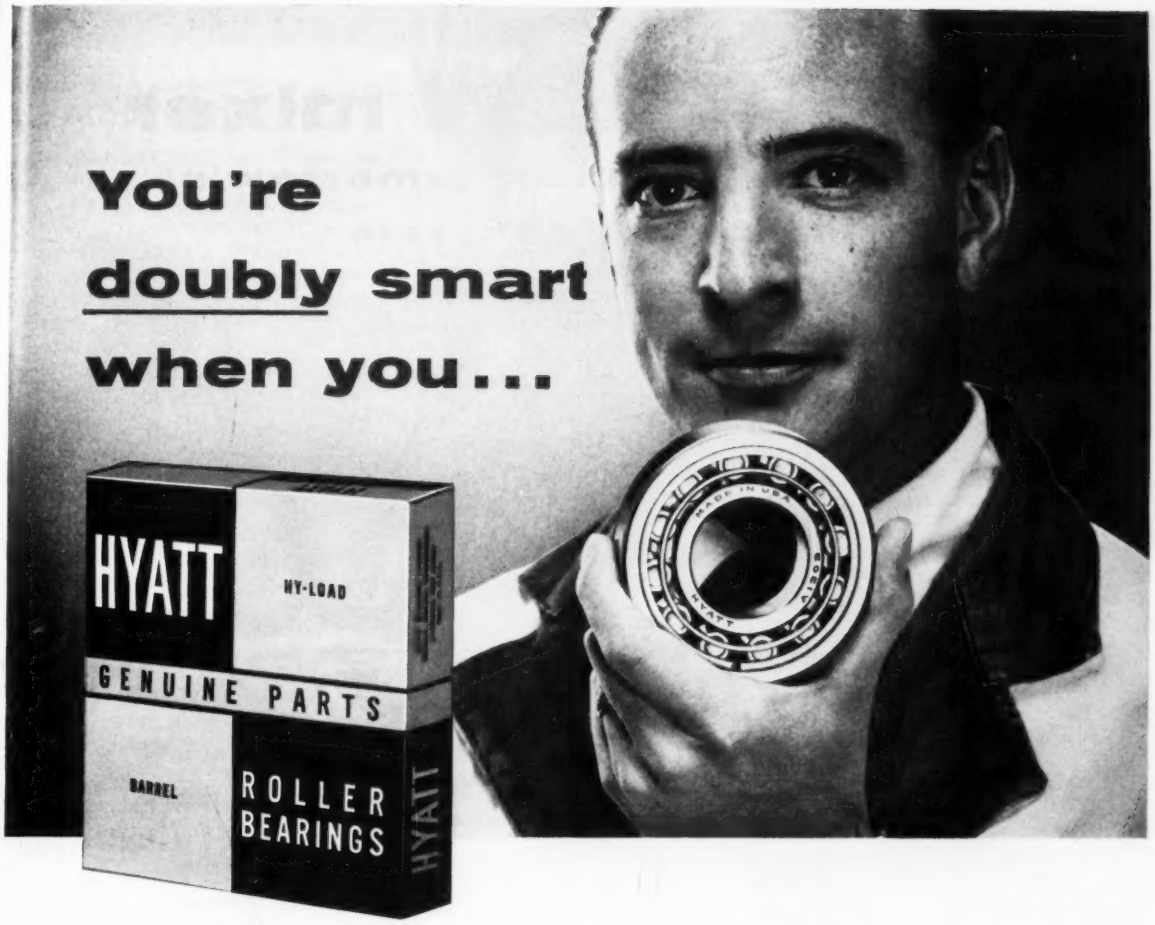
All three machines should please most operators. For their comfort and convenience, a new streamlined cab provides 360-deg vision and excellent ventilation. Other features include conveniently grouped controls and instruments, and light-pressure hydraulic clutch control of all operations.

The design of both the crawler and the truck-mounted machines has been kept as simple as possible to reduce the need for adjustments or constant servicing.

The new model 105AC crawler is equipped with 24-in. track shoes as standard equipment, but 16 and 32-in. shoes also are available. The crawler unit is powered from a separate standard swing drum assembly connected to the crane engine. This permits two-speed independent travel at ⅞ mph in low and 1¾ mph in high.

The three new models are additions to Quick Way's 6/10-yd-12-½-ton truck-mounted machine, and a 5/10-yd—10½-ton unit.

Continued on page 291



Always replace a HYATT with a HYATT!

There are two good reasons why you're smart to replace with *exactly the same* bearing the manufacturer specified for the application:

FIRST..... you assure the same smooth, trouble-free bearing performance originally built into the equipment.

SECOND.. you save time and trouble, because HYATT Hy-Rolls are so precision-built they're *completely interchangeable* without fitting adjustments.

Watch "WIDE WIDE WORLD"
Sundays on NBC-TV

Insist on HYATT Hy-Rolls—*be sure of lowest bearing cost per hour of service!* Hyatt Bearings Division of General Motors, Harrison, N. J.

Always look for the familiar blue and yellow box —when it comes to quality, there's no substitute for

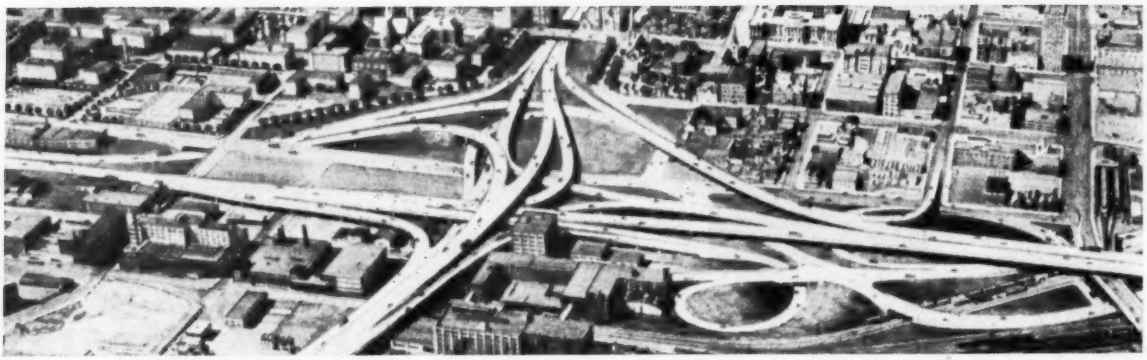
GM GENERAL MOTORS

HYATT HY-ROLL BEARINGS FOR REPLACEMENT

a great NEW mixer

ENGINEERED for tomorrow's "INSPECTION" TYPE concrete

the truck mixer of tomorrow, available now
built especially for low slump concrete
fastest charging and discharging
carries up to agitator
loads without a door



here's why

LARGER DISCHARGE OPENING... free-flow charging and discharging even with 0″ slump concrete.

SHORTER, BIG DIAMETER DRUM... faster, thorough mixing and better weight distribution.

SMITH QUALITY... research, design and manufacturing combined to give long life, low maintenance and superb mixer performance.

Designed to handle the most critical mix under the most adverse conditions of charging, discharging and length of haul.

Choice of sizes... 4½, 5½, 6½ yards.

Front pto... or *Separate engine drive.*

Write direct for details.

SMITH

Since 1900, the pioneer designer and foremost manufacturer of the world's finest mixers

THE T. L. SMITH COMPANY • Milwaukee 1, Wisconsin • Lufkin, Texas

affiliated with Essick Manufacturing Company, Los Angeles, California.

A-4009-1P.

Wooldridge

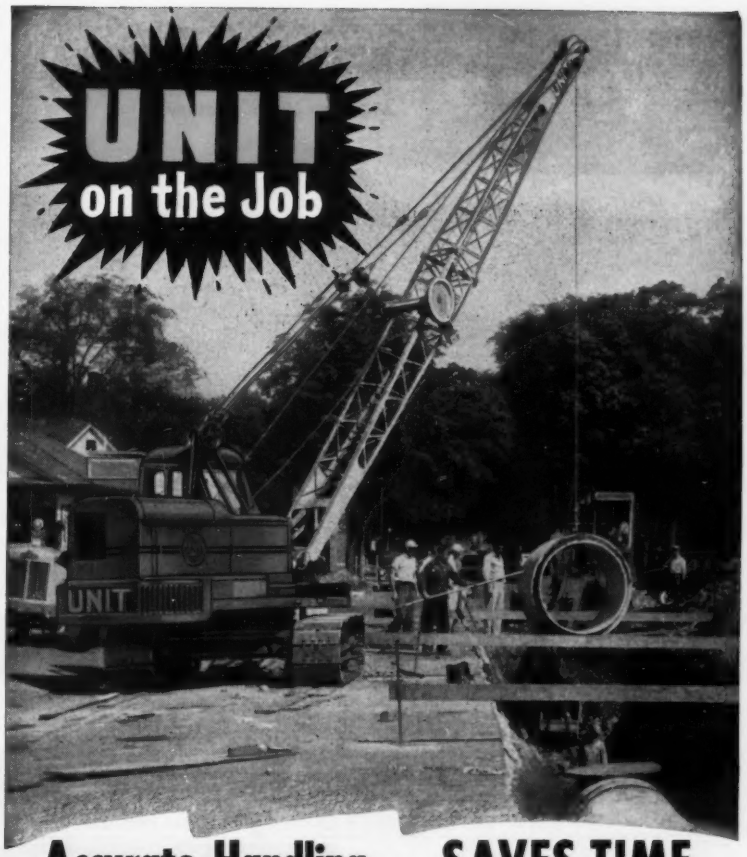
HIGHLIGHTING the Wooldridge Road Show exhibit, which will include production models of its complete scraper line, will be an advanced model of the 10-yd Corbrette self-propelled scraper. Although details of the new Corbrette are being kept under wraps until the show opens, company officials say that it will incorporate at least two major advancements new to the self-propelled scraper field. The Corbrette was introduced last year. It was the first scraper to include a push plate built into the main frame so that one scraper can help to push-load another unit. Other Wooldridge units on display will include the self-propelled 26-yd CobraQuad scraper, a 35-ton Cobrahaul dumper, tractor-drawn scrapers with 8 to 41-yd capacities, rippers, cable control units, and several experimental models of units now under development.

Chain-Belt

THE FULL STORY of a modern concrete road building operation will be demonstrated at Chain-Belt's Road Show booth. The complete package of Rex road building equipment—from forms to curing rigs—will be displayed in sequence to illustrate the latest in assembly line road building techniques. The Rex line was expanded recently when Chain-Belt acquired General Road Machines, Inc.

Stow

DESIGNED for the pre-cast field, Stow's new screed has one head that transmits vibration evenly to two beams so that the first beam strikes off the concrete and the second gives it a final finish. Single beam screeds sometimes give too much vibration when used on thin pre-cast slabs and air bubbles result. According to Stow, the new Twin-Beam unit eliminates this problem by dividing the vibration between two points so that air bubbles left by the first beam are struck off by the second beam. The screed is available with a 1-hp electric motor or a 2½-hp gasoline engine, both of which drive a 2½-in. vibrator head at 5,000 vibrations per min. *continued on next page*



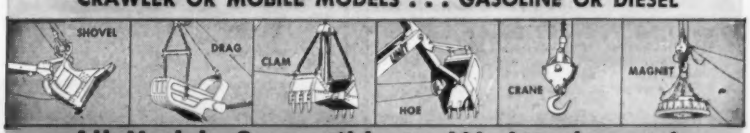
Accurate Handling . . . SAVES TIME

This sturdy UNIT Crawler Crane offers plenty of power plus accurate control. Spots heavy sewer pipe perfectly into the desired position. Adjustable Hook Rollers, Extra Long Crawlers and Wide Multiple Hinged Crawler Shoes provide all-around stability. Full Circle Swing, controlled from within UNIT'S FULL VISION CAB, provides safe and efficient operation. The operator has a complete view of the entire job at all times. GET THE FACTS! Investigate this modern UNIT and its many features. Write today for literature.

UNIT CRANE & SHOVEL CORPORATION
6305 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

UNIT

½ or ¾ YARD EXCAVATORS . . . CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL



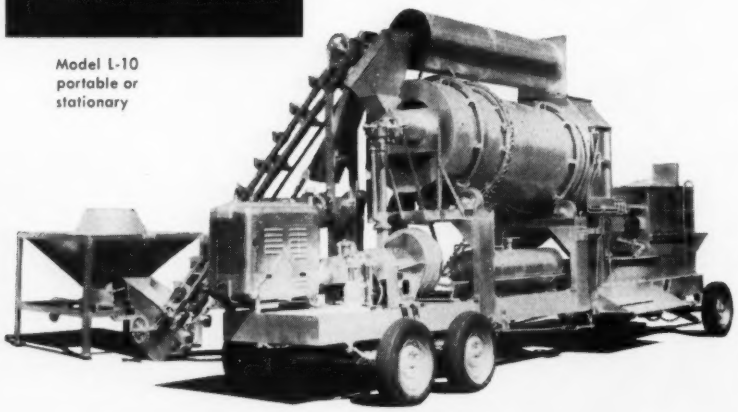
All Models Convertible to ALL Attachments!

White

NEW ASPHALT PLANT

$13,500 (f.o.b. factory)

Model L-10 portable or stationary



20 tons per hour hot mix capacity

Batch type 1000 lb. pug mixer with air-controlled gates. Has built-in asphalt heating kettle, reciprocating plate aggregate feeder. 50 hp engine or 30 hp electric motor. Write for catalog and name of nearest dealer. White Manufacturing Company, Elkhart 6, Indiana.

ONE MAN LOADS . . . ONE MAN OPERATES!

See it at ARBA Road Show in Chicago, Jan. 28 to Feb. 2.

COAST-TO-COAST offices provide

PROMPT SERVICE on Economy Forms

Rent Economy Steel Forms for your concrete construction and get:

- Overnight service almost anywhere in U. S.
- Saves time, material, money.
- Complete supervisory service.
- Form erection drawings.

Other forms from Economy are available on a purchase basis.

Write nearest office for catalog.

Economy Forms Corp.

DES MOINES, IOWA

Offices in St. Louis, Mo.; Kansas City, Mo.; Lincoln, Nebr.; Minneapolis, Minn.; Ft. Wayne, Ind.; Milwaukee, Wis.; Chicago, Ill.; Cincinnati, Ohio; Cleveland, Ohio; Metuchen, N. J.; Rochester, N. Y.; Springfield, Mass.; New York, N. Y.; Washington, D. C.; Decatur, Ga.; Charlotte, N. C.; Dallas, Texas; Tulsa, Okla.; Houston, Texas; Los Angeles, Cal.; Oakland, Cal.; Denver, Colo.

INDIAN

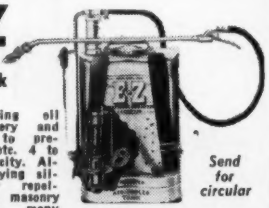
DRINKING WATER & SUPPLY TANK NO. 75G

Replaces unsanitary bucket and dipper. Portable. Push button faucet. Takes cold, clean water to workers right on the job. 5 gal. steel tank is curved to fit the back. Sturdy construction. Highly popular.

E-Z

5 gal. Knapsack Sprayer

For spraying oil on machinery and equipment to prevent rust, etc. 4 to 5 gal. capacity. Also for spraying silicon water repellents for masonry work and many other spraying purposes.



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DISCOUNT IN QUANTITY LOTS

D. B. SMITH & COMPANY

"Choice for Quality the World Over"

450 Main St. Utica 2, New York

Acme Iron Works

THE FEATURE of the Acme Iron Works exhibit at the Road Show will be the introduction of the Reverse-O-Matic drive Ingram roller. A 12-ton roller equipped with this new power concept will be displayed.

Reverse-O-Matic drive permits no-stop, power-shifted reversing with just one lever controlling both the speed and the direction of the roller. The roller can be shifted into reverse while moving forward with no delay for clutching or shifting gears.

Reverse-O-Matic is a sealed-in-oil unit that requires no maintenance or adjustment. It is said to reduce engine wear and prolong the life of the other power transferring mechanisms.

Hercules

ITS LINE of interchangeable gasoline and diesel engines will be featured by Hercules at the Road Show. Eighteen different bore sizes, in 3, 4, and 6-cylinder models, will be on display.

For all practical purposes, gasoline and diesel engines of the same cylinder size can be considered twins because they have the same appearance and mounting dimensions and are easily interchangeable. The gasoline models are called the G.O. series, and the diesel models are known as the D. D. series.

Littlefield

A BRAND NEW addition to the line of Littlefield black-top maintenance equipment—the model 25T portable Trail-O-Dryer and dual feeder bin combination—will be spotlighted by Littlefield at the Road Show.

The combination dryer-bin unit is intended to fill the need of contractors and maintenance crews for a small, low cost aggregate dryer. The new unit is designed to feed hot, pre-mixed dry material to Littlefield's Trail-O-Patcher, which mixes the aggregate and asphalt together for discharge into trucks without rehandling. The Trail-O-Dryer has a capacity of 15 tph.

The 101-SE is a highly portable plant. The frame is extra strong to hold rigid alignment of all equipment and drives. A rocker beam with full width axles supports most plant weight. Four wheels, each with dual tires, oscillate separately to compensate for rough terrain.

Big Production at your Fingertips with the New AUSTIN-WESTERN push-button controlled Diesel-Electric 101-SE

Here's a high output, mobile gravel plant that combines top efficiency with modern ease of operations and low maintenance. It is DIESEL-ELECTRIFIED, PUSH-BUTTON OPERATED—a triumph in crusher engineering.

All plant components except jaw and roll crushers are electrically operated in this closed circuit plant. All operations are powered with individual electric motors through short coupled V-belt drives, instantly controlled from the operator's platform. Chains, idlers, sprockets and clutches, normal cost items on mechanical plants, are eliminated.

Regardless of load, all components operate at peak efficiency at all times, delivering top production and accurately sized aggregates. A single convenient push-button station controls the plant.

See your nearby Austin-Western distributor . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio, for illustrated booklet.

COMPARE . . . then you'll specify AUSTIN-WESTERN

Welded steel plate crusher frame for high strength without weight of cast steel frame.

Inclined positive-throw type vibrating screen.

All bearings are anti-friction type.

Machined steel toggle plate for absolute protection of crusher.

SEE THE 101-SE PLANT AT THE ROAD SHOW, BOOTH 702, AREA D.

AUSTIN-WESTERN
CRUSHING, SCREENING AND WASHING EQUIPMENT

BALDWIN BLH LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON
Construction Equipment Division — LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation
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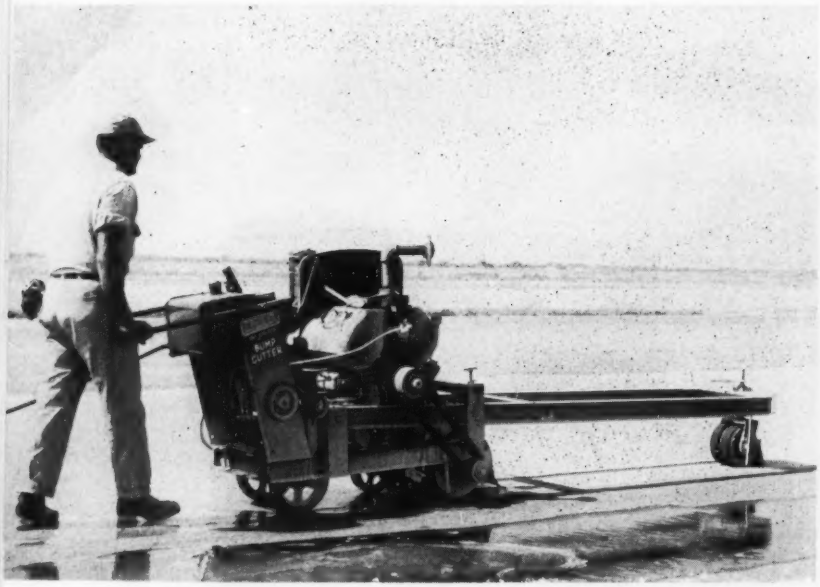
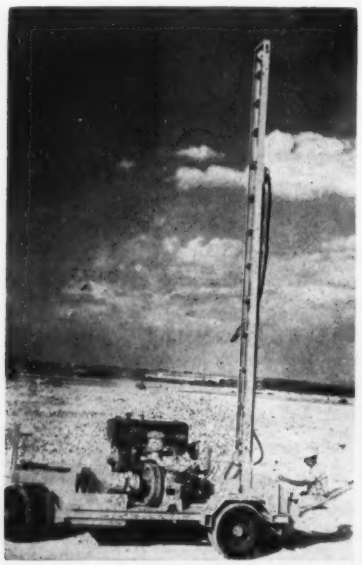
Construction Equipment News . . .



Planes Concrete

The new Concut Bump Cutter is shown planing down a concrete runway at Davis-Monthan Air Force Base, Tuscon, Ariz. The unique machine can also be used for removing old markings, leveling bridge decks, removing accumulated old rubber from runways, as well as for removing bumps from concrete or asphalt surfaces. A 36-hp engine drives diamond impregnated blades that form a 16½ in. wide cutting head. The rig leaves a non-skid surface similar to a burlap finish. Maximum depth of cut on the Davis-Monthan job was ½ in., and the speed of the cut was 100-fpm. 66,000 sq ft were planed.—**Concrete Sawing Equipment Co., Inc., 331 North Santa Anita Drive, Arcadia, Calif.**



Drills Fast

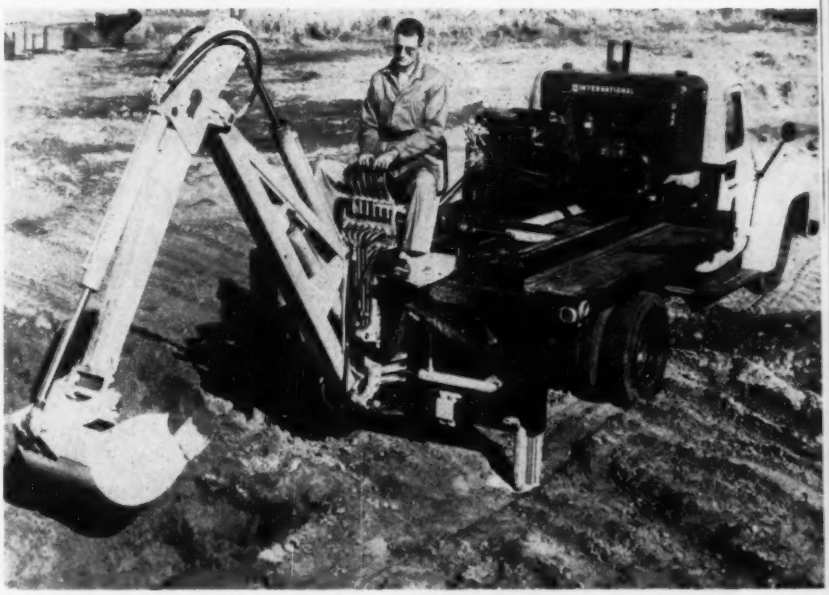
In tests, the Damco Blastholer has drilled an 11-ft deep hole and been moved into position for drilling at a new location within 2 min. The operator sits and rides on the rig through all drilling and moving operations. An integrated compressor blows the holes clear, and no other air is required. The rig drills 2½ to 3⅞-in. holes.—**Drilling Accessory & Mfg. Co., Inc., Box 5768, Dallas, Tex.**

Cab-Forward Jeep Carries Bigger Payloads

The new Forward Control FC-150 Jeep has been designed to get maximum payload in relation to the vehicle's compact 81-in. wheelbase. Because the cab is forward of the engine, the design also places the driver in a position that gives him all-direction visibility and excellent control of the vehicle. The truck is powered by the popular Willys F-head Hurricane engine, the same power plant used in standard Jeep models. The FC-150 incorporates four-wheel drive for off-the-road operations, but for highway travel it shifts easily into conventional two-wheel drive. The cab-forward design provides a payload area that is over 6-ft long. Overall length of the new Jeep is 147½-in., and overall width is 58¾ in. Turning radius is only 18 ft.—**Willys Motors, Inc., Toledo 1, Ohio.**

On or Off in Minutes

The new Davis backhoe can be removed or installed from the body of a 1-ton truck in less than 5 min. The basic backhoe frame and its engine fit onto a truck attaching kit that has retractable runners actuated by a hydraulic ram. This allows the unit to be removed from the truck with a hydraulic valve, leaving the truck bed entirely free. The backhoe remains in position so that the truck can back under it when it is needed again. The truck is not modified. The backhoe can be either the standard model 185, or the new Davis 210, which can operate through a 200 deg continuous arc without changing pins and without cables.—**Mid-Western Industries, Inc., 1009 South West St., Wichita, Kan.**



Hammer Works Faster

A bigger engine and a heavier hammer give the model SPHH-1000 Ottawa Hydra-Hammer increased production capacities on pavement-breaking, cutting, and backfill tamping jobs. The operator also has better control over the force of the hammer so that he can deliver a blow ranging from 100 to 7500 ft lb.—**Ottawa Steel Div., L. A. Young Spring & Wire Corp., Ottawa, Kan.**

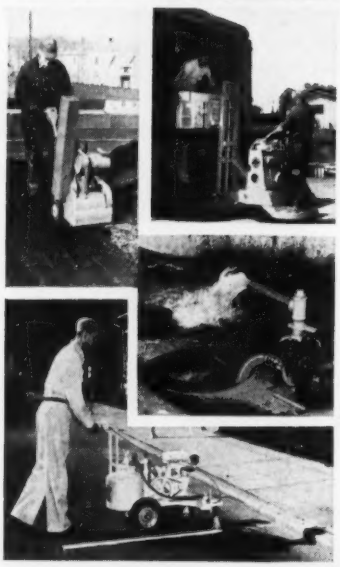
Scoot-Crete Takes Grades in Its Stride

Because the drive wheels of the self-propelled Getman construction buggy are located directly under the load, it has the traction to climb 25 deg grades. Called the Scoot-Crete, the buggy can carry loads up to 3,500 lb., and it has a top speed of 15 mph. The power plant can be either a standard Wisconsin gasoline engine or a West German Deutz air-cooled diesel engine. Prices of the units vary from $865 up to $1,899, depending on the type of engine and auxiliary equipment. The Scoot-Crete features caster steering that permits it to turn in its own length, and tires with deep treads that provide good maneuverability over rough terrain. Above, the Louis Garavaglia Construction Co. uses the rigs to place concrete on their Mackinaw bridge project.—**Getman Brothers, South Haven, Mich.**

On more and more construction equipment

KOHLER ENGINES

help keep performance up··· costs down



Wherever power equipment is used in construction, you'll see a steady increase in the number of Kohler Engines giving sturdy, reliable, cost-saving service.

Precision-built to Kohler quality standards, Kohler Engines insure full-rated power in a wide range of sizes, with maximum response to heavy loads, remarkable low speed performance, snappy all-weather starting. Large bore and modern short stroke cut engine friction, increase piston ring life, give utmost useable power. Fully anchored magneto has easily accessible outside breaker points. All models have liberal oil capacity—pressure lubrication on the two larger sizes, K330 and K660. The K660 has tapered roller bearings at both ends of the crankshaft, smaller models have ball bearings at both ends. Sturdy compact design provides low weight per H.P. output. Special silencer muffler and large capacity oil bath air cleaner lessen noise. Smooth, balanced operation reduces equipment vibration, cuts wear, prolongs life.

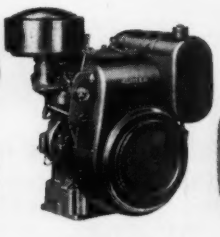
Kohler branch offices are located in 16 principal cities. Sales and service organizations throughout the country have parts available and will assist you in selecting a Kohler Engine best suited to your needs. Write for information.

Modern short stroke • 4-cycle • Air-cooled

K90—1.8 to 3.6 H.P.

AN INVITATION . . . Visit the Kohler Co. display of engines and electric plants at the ARBA Road Show, International Amphitheatre, Chicago, January 28 through February 2. Booth 309, Avenue C, upstairs, North Hall.

K160—3.7 to 6.6 H.P.



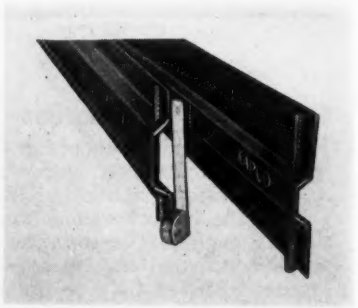
K330—8.2 to 12.5 H.P.

K660—15 to 26.8 H.P. (2 cylinder opposed)

Kohler Co., Kohler, Wisconsin • Established 1873

KOHLER OF KOHLER

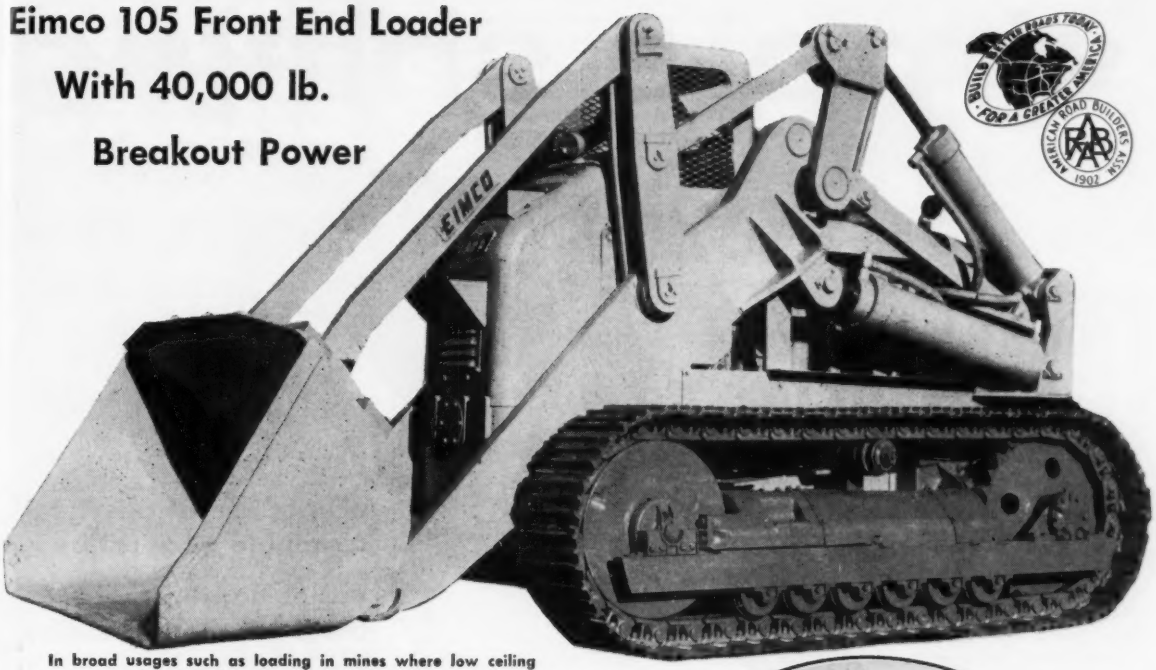
PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS
AIR-COOLED ENGINES • PRECISION CONTROLS



AIRPORT JOINT—A new tongue-and-groove joint has been designed especially for airport construction where slabs range from 14 to 20-in. deep. Called the Kapco joint, it features a non-metallic key that is 1¼-in. deep, 4½-in. wide at the base and 3½-in. wide at the top. It consists of strips of mastic board about ⅛-in. thick with outside liners of asphalt-saturated heavy kraft. It is pre-formed to provide a tongue and groove design, and pre-punched to accommodate steel dowels and stake pins. The joint is said to be rustproof and weather proof, it is priced at only a fraction of the cost of steel.—**Presstite-Keystone Engineering Products Co., 101 E. Ontario St., Chicago 11, Ill.**

PLACES FILL—The new Power-Pack conveyor for back filling ditches, trenches, or pipelines is designed to unload material smoothly and quickly from dump truck to ditch. It delivers material up to 8 ft beyond the side of the truck, and at heights up to 3 ft. A feature of the unit is an adjustable discharge deflector that controls material placement. Adjustments of belt speed and the volume of material delivered can be made while the unit is in action through convenient

Eimco 105 Front End Loader With 40,000 lb. Breakout Power



In broad usages such as loading in mines where low ceiling prevents overhead discharge . . . razing brickwork in open hearth furnace slag pockets . . . cutting smooth grades where fine control is required . . . loading into haulage equipment where high discharge is necessary . . . loading into light units or handling fine, dusty and wet material where controlled discharge is desirable . . . loading around wharves, docks, railroad yards (with fork lift attachments) . . . the 105 fills industry's requirements for a rugged, extra heavy-duty front end loader.

NOW! EIMCO HAS TWO RUGGED LOADER ASSEMBLIES

Productive scope of the Eimco 105 Crawler-Tractor has been broadened again by development of a heavy-duty Front End Loader.

For the first time, this provides the earth-moving industry with a machine that can utilize two unique loading attachments . . . each employing entirely different operating principles for jobs where physical conditions make the use of one advantageous over the other.

Since introduction of the 105, heavy construction industries in all parts of the world have praised the digging and loading speed of Eimco's rugged Rocker Arm Excavating Loader.

Like this and all Eimco equipment, the Front End Loader reflects years of constant development combining research with practical field experience.

Exclusive features of the hydraulic system provide an extra margin of protection against mechanical delays and the torque converter transmits maximum power from engine to boom and bucket cylinders for powerful digging effort at the bucket lip.

EIMCO 105 EXCAVATOR

All attachments (including bulldozer assemblies) are Eimco-built to standard SAE mounting dimensions for the basic 105 Tractor. This means that you get extra performance from every attachment through operating ease, maneuverability and visability . . . permits you to increase your earning potential without the addition of specialized machinery.

Each of these dirt-moving tools gives you new production and profit opportunities well worth investigating. Do this today by writing The Eimco Corporation for full particulars.

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B-236

simple shifting

means

1 proper use of all available gear ratios

2 easier handling rigs; better maneuverability

3 reduced driver fatigue; safer operation

EATON
2-Speed Truck
AXLES

Eaton 2-Speed Axles not only let drivers select from TWICE the conventional number of gear ratios, but they make these ratios available at finger touch. Result: drivers use the right gear ratio for every road and load condition; engines operate in their most economical speed range; stress and wear are reduced on all power-transmitting parts. Trucks cost less to operate and maintain; last thousands of miles longer; and bring higher allowances at trade-in time.

More than Two Million Eaton Axles in Trucks Today. For complete information, see your truck dealer.

EATON

AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Engine Valves® Tappets® Hydraulic Valve Lifters® Valve Seat Inserts® Jet Engine Parts® Hydraulic Pumps Motor Truck Axles ® Permanent Mold Gray Iron Castings ® Forgings ® Heater-Defroster Units ® Automotive Air Conditioning Fastening Devices® Cold Drawn Steel® Stampings® Gears ® Leaf and Coil Springs® Dynamatic Drives, Brakes, Dynamometers

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the complete line for every need!

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JOYCE AIR MOTOR JACKS WITH TOE LIFT
JOYCE AUTOMATIC LOWERING JACKS

Pick any lifting job . . . you'll find there's a Joyce Jack that will fill the bill! For Joyce builds a complete line of ratchet, screw, hydraulic, air operated jacks, trench braces and material lifting equipment . . . to meet every lifting application. And you can depend on Joyce Jacks too . . . for Joyce top-quality products have been the by-word for lifting equipment since 1873!

. . . write for complete information today!

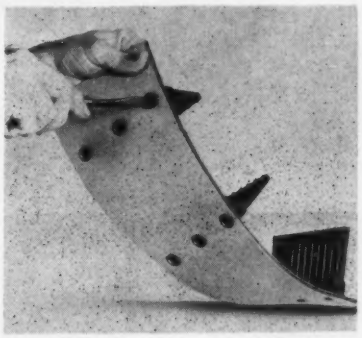
IN CANADA: Midland Foundry & Machine Co., Ltd., Midland, Ontario

JOYCE

THE JOYCE-CRIDLAND CO.

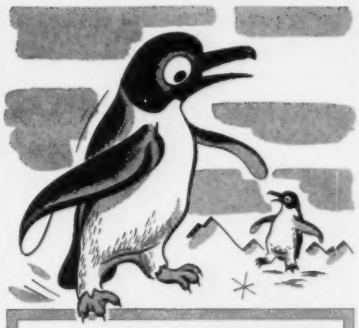
DAYTON 3, OHIO

controls. The conveyor, which can be quickly connected or disconnected from the hauling vehicle by means of a cable hitch, is powered by an 8-hp gasoline engine. It has a capacity of 3 tpm, and can unload and distribute up to 700 tons per day. The 2-yd hopper can be used as a spreader when the conveyor is not needed.—**Power-Pack Conveyor Co., 13910 Aspinwall Ave., Cleveland 10, Ohio.**



CONVERTS CONVEYORS—A molded DuPont neoprene screw-on cleat set makes it possible to easily convert any conveyor or elevator belt into a cleated belt. All that is required to make the conversion is a punch and a screw-driver. The cleats are attached to the belt by flat-head screws and special countersunk washers that are secured to metal inserts vulcanized in the base of the cleat. The inserts are imbedded in concave cups. When the screw is tightened against the washer, it pulls the belt into the cut, and both screw-head and washer sink below the surface of the belt where they will not contact the pulley. Called Tatch-A-Cleats, they are resistant to oil, heat and mild acids. They come in ⅝ to 3-in. heights and 1½ to 24-in. widths.—**T. H. Hinchcliffe, 1450 LaLoma Rd., Pasadena 2, Calif.**

TRUCK LINE EXPANDS—Four six-wheel-drive models and two four-wheel-drive models have been added to International Harvester's line of all-wheel-drive trucks. The new six-wheel-drive models are the SF-170 with a GVW rating of 22,000 lb; SF-172 with a GVW rating of 26,000 lb; SF-180 with a GVW rating of 30,000 lb; and the SF-182 with a 33,000 GVW rating. The four-wheel-drive units are the S-170 with a 10,000 GVW rating and the S-180 with a GVW rating of 20,000 lb. The all-wheel-drive feature com-



LOW TEMP LUBRIPLATE

* Best for Sub-Zero Lubrication

Highly recommended for general grease applications on all types of machines operating at very low temperatures. Remains plastic at temperatures as low as 70° F below Zero and has a Melting Point of 270° F. Possesses high film strength and is of a consistency that meets all requirements. Can be easily applied through grease guns or by other means of application. Low Temp Lubriplate is waterproof and will protect automotive and other types of equipment against the unfavorable effect of salt or calcium chloride as used on highways during winter months.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

For nearest Lubriplate distributor see Classified Telephone Directory. Write for free "Lubriplate Data Book". . . a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.

BITUMULS SOIL COVER
holds mulch on highway slopes

For fast, low-cost erosion control, Roadbuilders in many sections of the country have found Bitumuls® Soil Cover highly effective.

On thousands of acres adjacent to the Ohio, Indiana and West Virginia Turnpikes, they have used newly-developed equipment to apply a mixture of a specially-developed Bitumuls adhesive and straw mulch at a rate of one-and-one-half tons of straw and 100 to 200 gallons of Bitumuls Soil Cover per acre.

The Bitumuls Soil Cover mulch resists the action of wind and rain; creates an artificially-held bed for seed-development; "gives nature a chance" to replace a cover-crop on the exposed areas.

Our office nearest you will gladly supply full details.

Tested, Proved, Specified and Used on thousands of acres on the Ohio, Indiana and West Virginia turnpikes, Bitumuls Soil Cover offers these advantages to any Roadbuilder:

1. *Positive adhesion*
2. *Fast, economical coverage*
3. *Easy, uniform placement, even on steepest slopes*

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200 Bush St., San Francisco 20, California
Baltimore 3, Md. · Mobile, Ala. · Inglewood, Calif. · St. Louis 17, Mo. · San Juan 23, P.R. · Oakland 1, Calif. · Perth Amboy, N.J. · Cincinnati 38, Ohio · Tucson, Ariz. · Portland 7, Ore.

bined with big tires and good ground clearance characteristics makes the new trucks available for off-highway operation where terrain requires good traction. Frame reinforcements have been extended forward beyond the front spring mounting brackets for additional front end strength and rigidity on all the new trucks. Full torque power take-off mounted on the transfer case is available. Gasoline and LPG engines are offered.—**Motor Truck Div., International Harvester Co., 180 N. Michigan Ave., Chicago, Ill.**

CHAIN SAW—A new 3-hp direct drive saw has been added to the Lancaster line of chain saws. Called the Log Jiffy, it is a compact, lightweight unit designed for all around use. Because it is equipped with fuel pump and diaphragm carburetor it can be used in any position. Features include automatic recoil starter, pistol grip throttle handle, flame arresting muffler, and a positive chain tightener. A cheaper model is also available with a float-type carburetor.—**Lancaster Pump and Mfg. Co., Inc., Lancaster, Pa.**

VERSATILE CLEANER—Instant choice of many types of cleaning actions is the prime feature of the Series 4000 Hypressure Jenny—a new high pressure cleaner made by the Homestead Valve Mfg. Co. By setting valves on a simplified control panel, the operator can get any cleaning action from 400 gph of clear cold water at 450 psi to a mixture of steam, water and cleaning compound at 325 deg. F. Its versatility enables it to handle such diversified jobs as blasting mud or

Adams 660, push-loading a Model D Tournapull, kept firm footing in this heavy gumbo. Special push-plate was made by contractor.

Excavates and sub-grades streets *for Wichita subdivision*

At Woodlawn Village, a new residential subdivision east of Wichita, Kansas, Ritchie Bros. Construction Co. of Wichita contracted to excavate streets in a section of this 160-acre residential development by Wheeler-Kelly-Hagny Realty Co.

The Ritchies used 3 self-propelled scrapers and an Adams 660 grader to handle this street excavation work. The "660", with its wide range of speeds — forward and reverse — got around fast to push-load the 3 scrapers and level sub-grade for subsequent paving. Machines worked in heavy gumbo most of the time.

Foreman J. H. Boaz said this about the grader's performance:

"I have had over 20 years' experience in all types of construction, both heavy and light. The 660 is the best all-around grader I have seen."

Quick back-up (to 13.7 mph) saves valuable time on shuttle grading. Operator has clear view of work, wide range of speeds to get more work done in less time, with Adams 660.

Operator Dean Wolf used 2nd gear, 3.3 mph, to push-load. "It seems to me," Wolf stated, "that the Adams is the best grader in use today. The machine outperforms any I have used, and visibility of the blade is good."

Wide range of speeds gives Adams the advantage in working any kind of material. Heavy Adams graders have 8 forward speeds, to 26 mph. With optional "creeper" gears, 3 extra-low speeds, from 0.23 to 1.82 mph, may be added. These low speeds move heavier loads, handle rocky material with greater speed and safety, insure more accurate blade control in fine finishing when the main job is done.

The "660" has four reverse speeds, to 13.7 miles per hour, which save time on shuttle-grading in narrow spaces between houses and on short passes, where quick backing enables operator to get more work done in less time. Fast reverse speed is valuable also in quick positioning to push-load scrapers, saves time for both units.

Engine develops power-to-spare

Big 150 hp diesel engine of Adams 660 starts easily in any temperature, develops power-to-spare, with lugging ability to move heavy loads in tough going. Engines in Adams heavy graders are rubber-mounted to reduce annoying vibration and promote greater efficiency of operator, with less maintenance on machine.

Heavy, box-construction, one-piece frame of grader resists shocks and stresses. Constant-mesh transmission makes gear-changing easy, lengthens life of gears.

Stops are safe and sure with double-action hydraulic brakes. Pressure on brake pedal stops transmission as well as drive wheels. Hand brake is used for parking.

Use performance yardstick

Buy your next grader on the basis of performance. Let us show you a modern grader at work, help you select the size best suited to your type of work operation.

A size ADAMS for every need

Model 660—150 hp diesel, 27,730 lbs.
Model 550—123 hp diesel, 23,500 lbs.
Model 440—104 hp diesel, 21,500 lbs.
Model 330— 80 hp diesel, 20,500 lbs.
Model 220— 60 hp diesel, 14,865 lbs.

TraveLoader — high-speed, heavy-duty, self-propelled, belt-type loader for all loose materials. 55 hp gasoline or 60 hp diesel engine. Wt. 16,800 lbs.

Tournapull—Trademark Reg. U.S. Pat. Off. AG-26-B-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

Correctly engineered to bear heavier loads, lengthen rope-life, reduce maintenance costs

• Because they're designed and engineered for specific tasks, you'll find MADESCO blocks with heavy steel shells and fittings your *safest* choice. In materials, in construction too, Madesco tackle blocks assure you the extra service that comes from over thirty years of specialized experience and "know-how." Buy Madesco blocks and you make substantial savings on your rope costs, because Madesco sheaves (of iron or steel graphite bronze) are correctly-grooved to prolong rope-life. Loads travel smoothly, easily, quickly to save lifting time; that means savings too that come from minimized maintenance and down-time. There's a complete line of Madesco tackle blocks for every need. Consult your industrial distributor—and meantime write for our catalog.

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MADESCO BLOCKS

MADESCO TACKLE BLOCK CO., Easton, Pa.

Welds.... runs tools and lights!

... take it ANYWHERE!

This handy HOBART Welder KEEPS JOBS MOVING

No contractor can afford to be without this valuable 2 in 1 unit that gives you welding current anywhere for maintenance repair and construction—and with the flip of a switch gives you 110 volt AC current for tools, lights, motors. Your own men can use—you save hundreds of dollars by doing your own repair work—by having current available for welding or power when and where you need it. Coupon brings complete information—no obligation. HOBART BROS. CO., Box 617, TROY, OHIO.

250 amp. "Contractors Special"

"Husky Boy" Air Cooled

AC welder-AC power combination

HOBART BROS. CO., Box 617, Troy, Ohio
Without obligation, send complete information on items checked:
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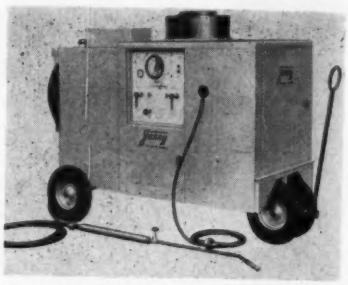
☐ AC Welder-AC Power Combination
☐ "Contractor's Special" engine drive
☐ "Husky Boy" Air Cooled DC Welder
Name_____ Position_____
Firm_____
Address_____

Hobart "One of the world's largest builders of Arc Welding Equipment."



clay deposits from heavy equipment, removing grease and dirt from equipment or floors, cleaning for repainting, or sanitizing or deodorizing. The cleaner is available in portable or stationary models with either electric motor or gasoline engine-driven pumps with a choice of oil or gas for fuel.—**Homestead Valve Mfg. Co., Coraopolis, Pa.**

BRUSH CUTTER—The new Dotmar Rota-Kut rotary brush cutter and chipper has a cutter blade that revolves at high speed to cut off brush and saplings up to 2 in. in dia. Additional chipper blades chop up brush into short pieces after they are cut. The blade is shielded so that stones or sticks cannot fly up. The unit slides on adjustable runners that can be set to cut within ½ in. of the ground. It can be mounted on any small tractor and it is powered through the power take-off by a shaft to the gear box on the cutter.—**Dotmar Industries, Inc., 502 Hanselman Bldg., Kalamazoo, Mich.**

KEEPS CABS COOL—A self-contained, self-powered mechanical air-conditioning system for truck and earthmoving equipment cabs has been developed by D. W. Onan & Sons. Called the Kab Kooler, the air conditioner cools, dehumidifies, and circulates clean air throughout the operator's compartment. All components, including the compressor, engine, fan, and condenser, are conveniently arranged in one compact housing that is easy to install on the roof of the cab. The

Cold facts about buying fuels, motor oils and greases

Why Standard Oil can serve you better

Got a construction job in the Midwest or Rocky Mountain states? Bidding on one? Already working a job? Then read how you can get better service and better fuels, lubricating oils and greases

How you get service on the job. In the 15 Midwest and Rocky Mountain states there are more than 3,900 Standard Oil bulk plants. With this many plants none can be more than a few miles from your job no matter where it is. Experienced men work out of these bulk plants to see that you get on-the-spot service. Still more men make deliveries to you. They see that your inventories of petroleum products are maintained day and night. If you work two shifts or even three, they may too.

In addition, there are 23 Standard Oil division offices in the 15 states. In each office there is a chief automotive engineer and a staff of automotive lubrication specialists. All of these men are qualified to give technical service. Most of the men have engineering degrees. All have received extensive training in Standard Oil's own Automotive Sales Engineering School. *All of these men are* Standard Oil Company *employees.*

The kind of service you get from STANDARD. Automotive lubrication specialists from Standard division offices will survey your equipment and recommend the fuels, motor oils, greases to use. They will help you set up a preventive maintenance program and suggest lubrication schedules. They will back this up with service from the Standard Oil bulk station so that your equipment is *never* idle for lack of petroleum products. Through them you have a direct line to Standard Oil headquarters and laboratory for additional help at any time you need it.

Why STANDARD OIL products are tops for construction equipment. Standard Oil lubricants, fuels and greases are approved by equipment manufacturers. But there's more to it than just that. Most big equipment manufacturers' plants are right here in the Standard Oil territory. Standard works closely with these manufacturers, knows what's needed of the fuels, motor oils and greases used in construction equipment. Standard Oil fuels, lubricants and greases are used by many manufacturers as drive-away products. All products equal or exceed specifications of the manufacturer. They will stand up to any job you give them with plenty to spare.

Refinery to you, it's all STANDARD. All Standard Oil fuels, lubricants and greases are made by Standard and delivered to you by Standard Oil employees. There's no jobber one place, distributor the next and company operation in the third place. Everywhere you go in the Midwest and Rocky Mountain states there is a *Standard Oil* owned and operated bulk plant within a few miles. You deal with one company. Every Standard Oil supply point is equally and uniformly well run.

How to get in touch. Because Standard Oil lubrication specialists so thoroughly cover their territory, you can depend upon meeting your man at any important contract letting—if you haven't already met him. If you miss him, look in the telephone directory of any town—no matter how small—nearest your job. You'll find the Standard Oil bulk plant listed under the Standard Oil name. If you still miss, sit tight, the Standard Oil man will be around to see you *before* you need him and he will be ready to serve you starting right then. If you would like more information right now, write or call Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Standard Oil serves these Midwest and Rocky Mountain states

Colorado	Iowa	Minnesota	Nebraska	S. Dakota
Illinois	Kansas	Missouri	N. Dakota	Wisconsin
Indiana	Michigan	Montana	Oklahoma	Wyoming

STANDARD OIL COMPANY (Indiana)

STANDARD

This trailer-mounted Model 250, shown cleaning blacktop dump truck, serves 4 shops.

Malsbary Steam Cleaner Proves "Quick Cure" for Maintenance Headaches, Winter and Summer

When Brown County (Wis.) bought a trailer-mounted Malsbary 250 HPC Cleaner in 1955, Commissioner E. Francis Brunette and Shop Superintendent Stanley Queoff soon found many uses for it other than shop cleaning work.

In winter, it quickly removes snow and ice from snow plows, trucks and traffic patrol squad cars, keeps them ready for quick action. When thaws threaten to flood roads, it is easily rolled out and acts as an extra culvert thawing unit.

During summer, the Malsbary 250 cleaner is kept in the field to clean blacktop mixing plant, and spreading and hauling equipment. Blacktop equipment is cleaned "every chance we get"... but all county equipment gets a thorough steam cleaning at least twice a year.

"Our cleaner averages 5 to 6 hours daily, 5 days a week. There's no comparison with methods used before. Time saved permits assignment of workers formerly used on cleaning, to other tasks. Even more important, all equipment gets more frequent attention. No trucks or graders need be out of action long, for cleaning.

"The cleaner adds punch to our toughest assignment, keeping highways open and safe during winter storms," reports Queoff and Brunette.

Special orifice in steam gun confines high-pressure stream to small area, speeds cleaning of motor grader and tracks.

Malsbary HPC — Fast and Efficient

Malsbary HPC (high pressure combination) cleaners combine pumped hydraulic and thermal pressures, give you a 300 to 400-lb. cleaning blast, hot or cold, with or without solution. This HPC blast cleans twice as fast as the largest steam vapor cleaner; 4 to 10 times faster than most, easily handles jobs other cleaners can't touch. HPC cleaners also supply wet steam for degassing and heating; low pressure hot water for rinsing.

See for yourself what HPC cleaning—available only from Malsbary—can do for you. Ask your Malsbary dealer for a demonstration on your job NOW, or write today for free catalog.

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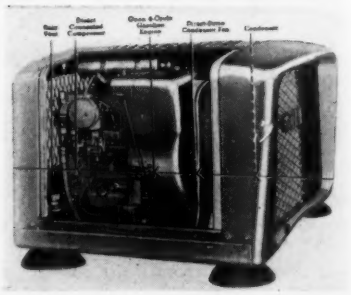
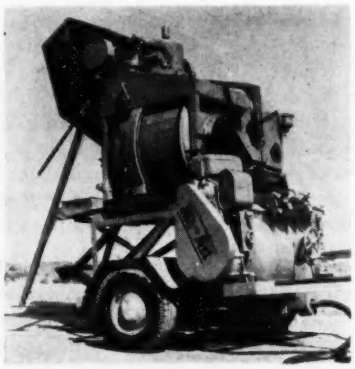
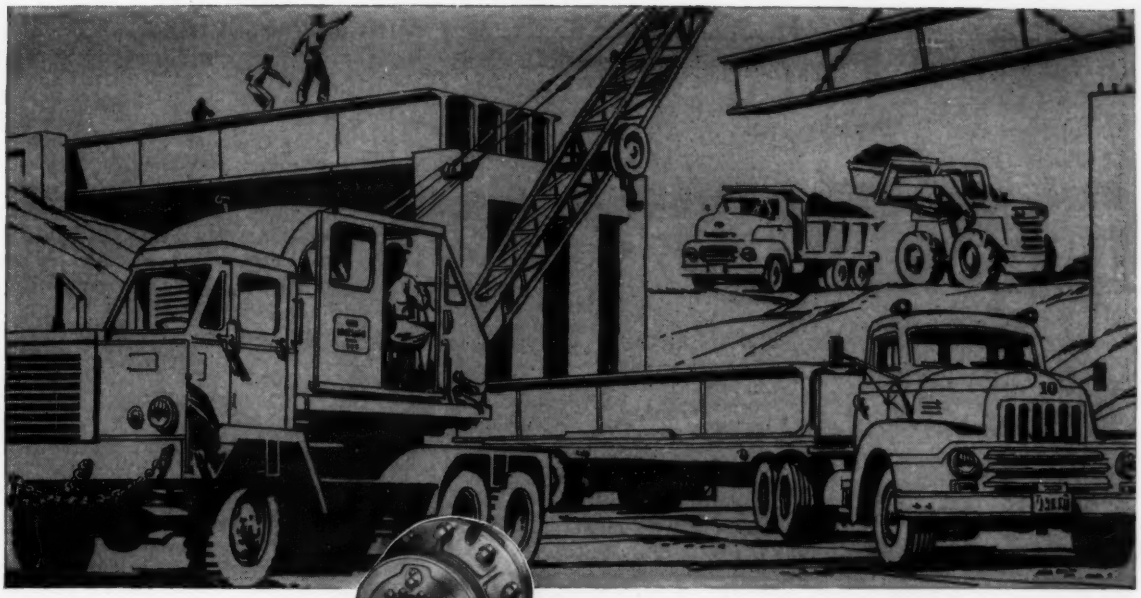
MALSBARY
SINCE 1921 MANUFACTURING CO.
Room C1, 845-92nd Ave., Oakland 3, Calif.



1 1/3-ton unit weighs only 225 lb. An air housing projects through the roof of the cab to provide two cold-air inlets and a return air duct. All controls are operated from within the cab. There is no need to place a condenser in front of the truck radiator, and the truck engine is not used. The unit is powered by a four-cycle, single-cylinder Onan engine that drives a directly connected compressor.—**D. W. Onan & Sons, Inc., Minneapolis 14, Minn.**



IMPROVED TRUE GUN-ALL—The new DC model True Gun-All gunning rig works on the same principle as previous models, but a new mixing and loading device increases its capacity. Up to 5 yd of concrete per hr can be placed with the new model by a five-man team. Previously, larger crews could not equal this production. The new model pre-mixes dry aggregate and cement and then loads the mix into twin tanks where hydration and remixing takes place before the concrete leaves the gun. The dual mixing chambers provide a continuous operation. A siamese valve switches flow from one tank to another so that while one tank is being worked the other is being charged. No sand dryer is needed because the True Gun-All rig uses sand of any moisture content. Controlled quantities of the

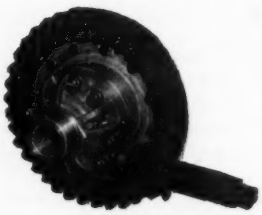


Check the amazing performance records set by this unique

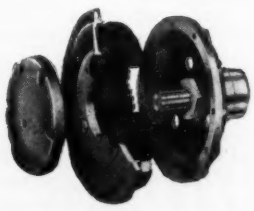
CLARK Planetary Axle

ideal final drive for

• Excavator-cranes and other heavy-duty industrial machines • Tractor Shovels, Bulldozers and similar construction equipment • Tandem Drive Units in all applications.



Primary Reduction in the center section, by helical bevel pinion and gear.



Second Reduction in the drive wheel —a sun gear splined to the axle shaft and three planet gears driving an internal gear in the inner periphery of the wheel, as close as possible to the point where tractive effort is applied.

Two types: steering and non-steering.

You've never, in all probability, seen anything quite like this extraordinary performer, for the reason that there isn't anything just like it.

Look at this record of the Clark Planetary Axle—

• 70% LESS TORQUE LOAD ON SHAFTS —planetary drive assembly takes 70 per cent of the torque load off the axle shafts. Result: shaft wind-up and surge are practically eliminated—and *broken shafts are virtually unknown.*

• LIGHTER WEIGHT—YET STRONGER—severest torque loads are handled easily by shafts and gears actually smaller in size and therefore considerably lighter in weight than other axles of equal capacity.

• ROAD SPEEDS UP TO 30 MPH—big time-savings in job-to-job travel.

Important: A number of operators, faced with difficult hauling conditions, have converted equipment of conventional type by installing Clark planetary axles—with remarkable success.

Doesn't it make complete good sense to find out about this remarkable piece of equipment—and how it may solve your problem? The coupon will get you prompt delivery of full information.

CLARK EQUIPMENT COMPANY • **AXLE DIVISION, Buchanan 6, Michigan**

CLARK® EQUIPMENT

Please send illustrated bulletin on the Clark Planetary Axle.

Name_____ Position_____

Firm_____

Address_____

City_____ State_____

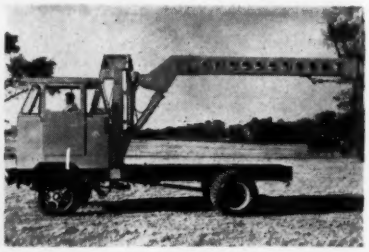
The ALL NEW BEAVER Speed-O-Matic

PORTABLE PIPE AND BOLT MACHINE

- 50% more speed and power from faster, all new motor! Motor and switch fully protected.
- New "CLEAR-VU," self-centering wheel and roller cut-off; die heads with high-speed steel dies; and reamer, all pivot mounted! Ideal for "make-up."
- Quick-acting Power Grip Wrenchless Chuck—forward or reverse!
- Threads ⅛" to 2" pipe (up to 12" with drive shaft) ¼" to 2" bolts.
- Instant and accurate easy-setting spool-type pipe support eliminates double chucking.
- Lubricated for life!
- Oiling tube directs oil right to threading dies! Shuts off automatically.
- Lathe-type thread length indicator.

Can't tell it all here! Send for New Beaver Quick Reference Catalog! Get the latest facts on ALL new Beaver machines!

aggregate and cement are introduced alternately into the 7-cu ft mixing chambers and then the exact amount of water required for the batch is measured in by a metering device. The material is then mixed and blown through a hose at the surface to be coated.—**True Gun-All Equipment Corp., P.O. Box 2526, Tulsa, Okla.**



HYDRA-LIFT CARRIER—A compact and rugged carrier is now available with the Pitman Hydra-Lift—a versatile, truck-mounted crane that has a maximum lifting capacity of 6,500 lb. The new carrier is equipped with extra heavy-duty frame, springs and axles. It has a wheelbase of only 144 in., yet there is also 144 in. of free space between the crane and end of the frame. The cab-over-engine carrier permits the operator to drive the truck to the job site and to operate the crane from the same seat. All he has to do is turn around in the cab's swivel-type seat. The Hydra-Lift can also be installed on conventional trucks of two ton or larger capacities. It needs only 44 in. behind the cab. Another optional feature is a new type of boom that makes it possible to haul higher capacity loads. Available with a hydraulically driven loadline winch, the boom hinges at the top of the crane's mast, leaving a much greater distance between the boom hinge point and the truck chassis. The new boom telescopes from 17 to 27 ft. Hydraulically operated boom swing, boom hoist and outriggers are standard.—**Pitman Mfg. Co., 300 W. 79th Terrace, Kansas City, Missouri.**

STEAM CLEANER—The new model 45 Vapor steam cleaner, which produces a steady jet of steam at 120 lb pressure, is said to be economical to operate. It consumes only 1¼ gal of #1 fuel oil per hr to turn 45 gal of water per hr into an effective steam cleaning jet. A 1/3-hp, 110-v motor drives the positive displacement water

GALION
14-20 TON

See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957

3 AXLE TANDEM ROLLER

The Galion 3-Axle Tandem Roller gives you a considerably smoother finish surface, and up to 60% greater tonnage of material compacted per day than with conventional tandems. You get faster and better compaction of joints and seams. Elimination of cross-rolling saves you time and money.

Other features include Galion ROLL-O-MATIC Torque Converter Drive . . . Synchronized hydraulic steering of twin guide rolls . . . Dual operating controls . . . Rugged straight-line spur gear final drive . . . Complete and easy accessibility of all operating parts. Write for literature.

*Utilizing a General Motors-Allison Torque Converter

ESTABLISHED GALION 1907

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GALION, OHIO, U.S.A.

ROLL-O-MATIC* TORQUE CONVERTER DRIVE IS STANDARD EQUIPMENT

GALION gives you the most effective and economical driving power obtainable. The ROLL-O-MATIC Torque Converter Drive differs from a fluid coupling drive. A fluid coupling transmission requires a manual gear shift mechanism, and the fluid coupling itself never multiplies engine power.

The Galion ROLL-O-MATIC Torque Converter Drive has no gear shift mechanism. Furthermore, it automatically MULTIPLIES the engine driving force by means of oil in motion instead of by transmission gears. It automatically APPLIES the driving force as the work demands. When the Governor Lever is moved to a selected rolling speed, the engine power will be applied and regulated AUTOMATICALLY —

UP HILL
ON THE LEVEL
DOWN HILL
Rolling speeds as low as .3 m.p.h. and up to 5.5 m.p.h. are possible. Reversing action is velvet-smooth, shock loads are eliminated.

THE GALION IRON WORKS & MFG. COMPANY
Dept. CM-17 Galion, Ohio, U.S.A.

Please send me literature on the Galion Rollers checked.

☐ 3-Axle Tandem ☐ Three-Wheel ☐ Trench
☐ 2-Axle Tandem ☐ Portable

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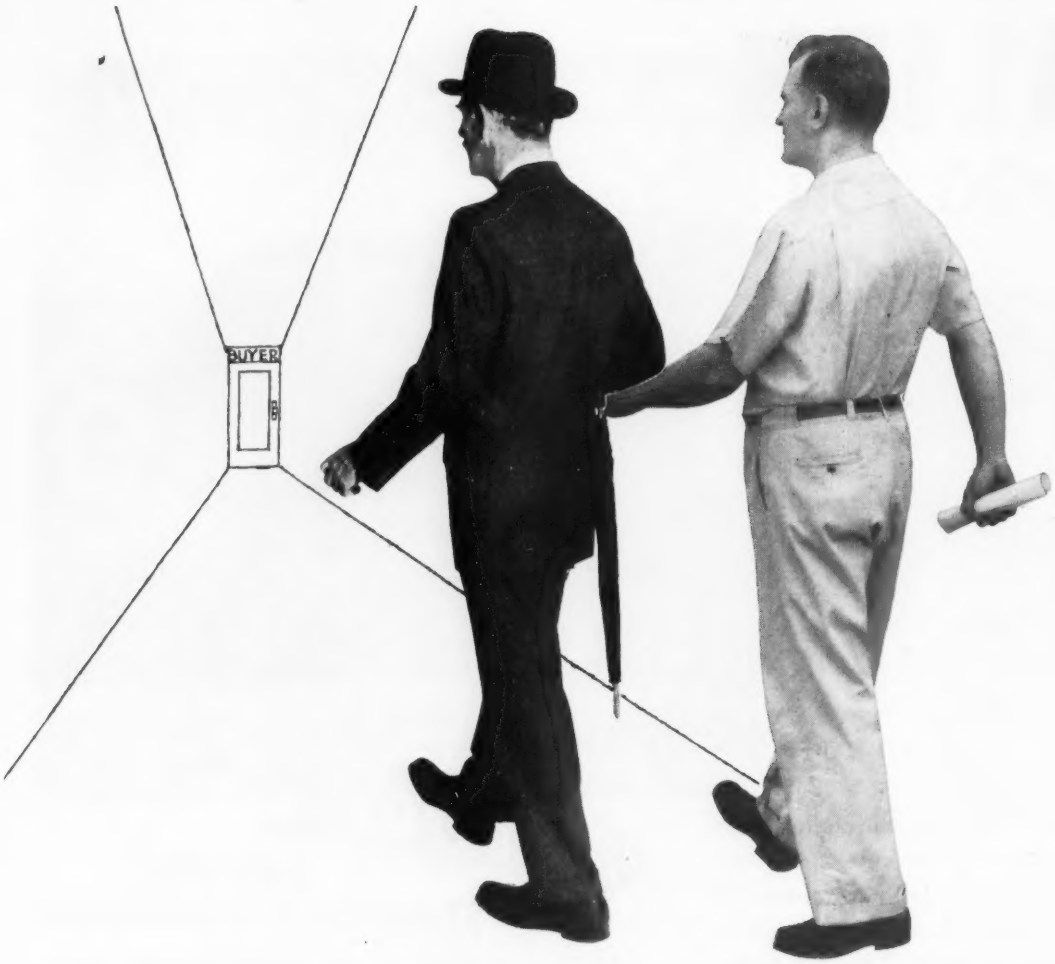
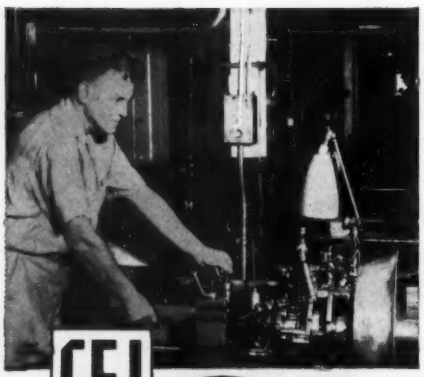
CITY _____ STATE _____



Your Wickwire Rope Distributor and our closer operator ...ready to help you



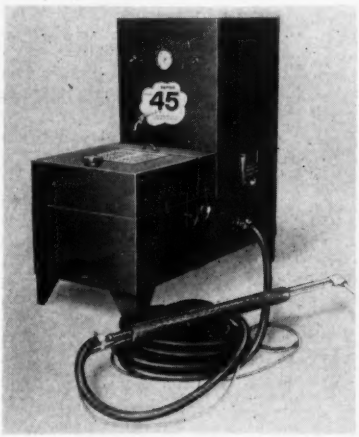
This closer operator—running a machine which forms our rope—is with your Wickwire Rope Distributor every time he makes a call.

True, he's physically in the mill, where he's carefully conducting this final fabricating operation. But, whenever your Wickwire Distributor makes a call, he has the full assurance that every foot of Wickwire Rope has been carefully assembled by skilled craftsmen . . . and that it will give you long, trouble-free service on your job.

It's just one more reason why your Wickwire Distributor knows he's got top-quality wire rope, slings and strand to sell . . . and that these products will serve you well.

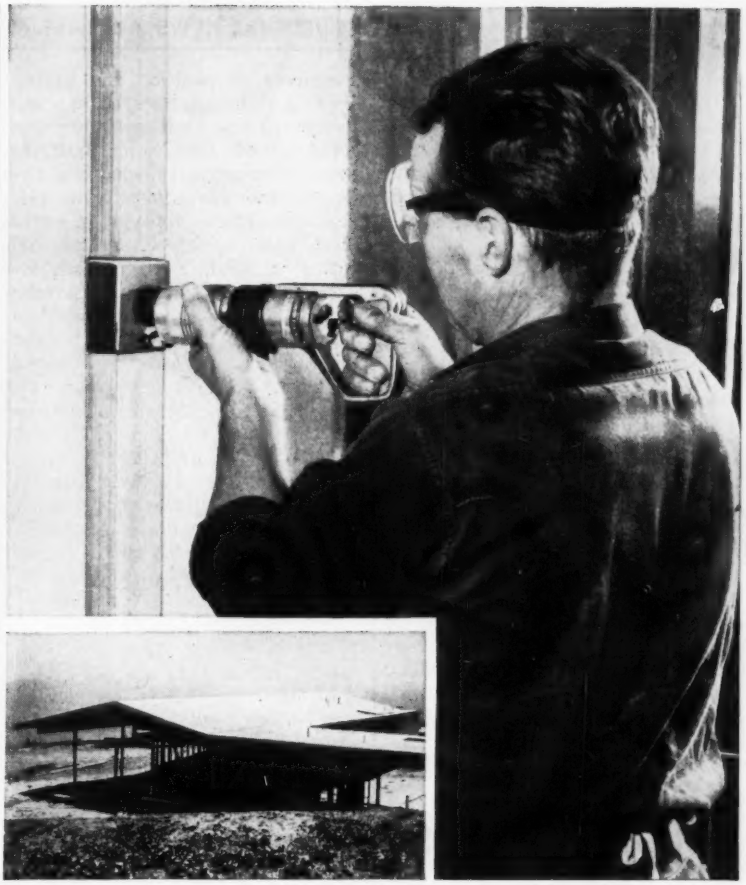
4085

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION



pump. The fuel tank holds enough fuel to do four hours of steady steam cleaning. All operating switches and controls are panel mounted on the outside of a compact cabinet. It comes with a venturi-type gun, and 16 ft of heavy-duty wire-braided steam hose and cleaning solution hose. List price for the complete unit is $359.—**Vapor Heating Corp., Dept PR-56, 80 E. Jackson Blvd., Chicago 4, Ill.**

DIGS ON BOTH SIDES—Highway Trailer Co.'s new truck-mounted earth-boring machine features a hydraulic turntable base with a swivel action that permits it to operate at any angle through a full 180-deg arc without having to move the truck. The swing-base earth borer digs holes from nine to 36 in. in dia to a depth of 10 ft. It has these advantages over the conventional fixed-platform type that operates off the tail end of a truck: the swing base allows the boring head to dig from either side of the carrier; the truck does not have to



California contractor estimates:

Time and labor costs cut 75% with the Remington Stud Driver

Out on the California coast, "Research House" has taken shape. It's an experimental house sponsored by Associated Architectural Publications and the latest tools have been used to build it—such as the Remington Stud Driver.

Contractor Bert Pickney says, "The Stud Driver cuts time and labor costs around 75% in anchoring beam supports, partition sills and furring to concrete. It took us only half a day to install the sills—a 2-day job with bolts. No pre-drilling is necessary, and sills are set tight! I certainly recommend the Stud Driver to any contractor!"

YOU CAN SPEED ALL STUD FASTENINGS—light, medium and heavy-duty—with the Remington Stud Driver. It sets *both* ¼" and ⅜" diameter studs in steel or concrete—up to 6 studs a minute either size. The tool is cartridge-powered, portable, ready to work *anywhere*. Forty styles and lengths of Remington Studs to choose from. Get full details by mailing coupon.

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STUD DRIVER

Industrial Sales Division, Dept. CME-1
Remington Arms Company, Inc.
Bridgeport 2, Conn.

Please send me your free booklet which shows how I can speed the job and save with the Stud Driver.

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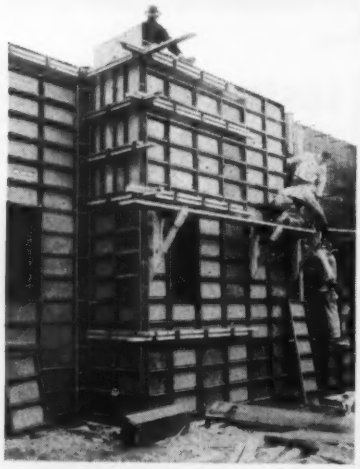
Get Cash Guarantee of Savings on Concrete Forming

Atlas Compo Forms are the simplest, easiest and surest to use: are *guaranteed in writing* to save 5¢ to 20¢ per square foot on most jobs over other forming.

ATLAS COMPO FORMS



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New York 7, N. Y.

EQUIPMENT NEWS . . . Continued

maneuver to position the boring head in tight quarters; it can dig a series of holes without the truck being moved. Besides its ability to swivel through a 180-deg arc, the rig has other advantages: hydraulic extension action gives it an extra 22-in. reach within its operational radius; a leveling mechanism attached to the boring head permits it to bore in absolute vertical plumb even if the carrier is parked on a slope; the unit can be mounted on a single or tandem rear-axle truck. The earth borer can be equipped with an integral winch and derrick apparatus so that it can set poles up to 45 ft long. A telescoping derrick with a 3500-lb capacity is also available as optional equipbment.—**Highway Trailer Co., Edgerton, Wis.**

CIVILIAN CRANES — Hanson Clutch & Machinery Co., engaged for a number of years in producing excavators for the Armed Forces, has again turned its facilities to civilian output. The move is accompanied by a revamping of its line of power shovels, cranes, and trench hoes. Pictured is a 20-ton crane that is readily convertible to ¾-yd shovel. The truck unit can be any of several heavy-duty standard makes. The operator has independent control of all crane operations including the power boom hoist. The Hanson line now includes ⅜-yd, ½-yd, and ¾-yd shovels with crane capacities ranging from 7½ to 20 tons. All are available with crawler or truck mountings.—**Hanson Clutch & Machinery Co., Tiffin, Ohio.**

JOB PROTECTION—Owl-Lite is an all-metal construction barricade with a self-contained battery, flasher unit, and light enclosed inside the barricade's framework. The light delivers an average of 100 red or amber flashes per min that can be seen for distances of up to one mile. Additional protection is afforded by Scotchlite markings on the barricade side in black and

full 90° bend with one stroke of the ram . . . easy portability . . . extra versatility

Here's the kind of real portability you've been looking for in a bender for ½" to 2" pipe and conduit. Using light, but strong, aluminum alloy for many parts, the new GREENLEE No. 880 Hydraulic Bender is unusually *lightweight*, yet extra rugged, fast, powerful . . . produces 15 tons of ram force! One man can easily carry and operate it to quickly make uniform bends. Complete 90° bends can be made with one ram stroke. Separate two-speed hydraulic hand pump and bending ram simplify handling and setup. Easily operated by hand or may be teamed with a GREENLEE Power Pump for fast production jobs. Attachments also available for bending thin-wall conduit, tubing, bus-bars. Get complete details on how to speed jobs and get better results with the new GREENLEE No. 880 Bender. Write for Bulletin E-217.

GREENLEE

GREENLEE TOOL CO.
2181 Columbia Ave., Rockford, Illinois

See the LATEST in BIG LOADERS at the Road Show

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new TRACTOMOTIVE TL-20 TRACTO LOADER

20,000 lb
2-cu yd capacity • 100 hp

HAS—

FULL POWER-SHIFT TRANSMISSION that enables you to go from any forward to any reverse speed instantly. You quick-shift "on the fly" — no stop-and-go shifting.

HAS—

HYDRAULIC TORQUE CONVERTER DRIVE that multiplies torque 350 percent . . . provides the smoothest loading action you've ever seen in a wheel loader. No butting or ramming, no engine stalls.

HAS—

- High Traction Differential with Pin-Connected, PLANETARY AXLES
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- One-Piece Welded Frame

Only Tractomotive brings you all these operating and service advantages. You PAY LESS . . . You GET MORE.

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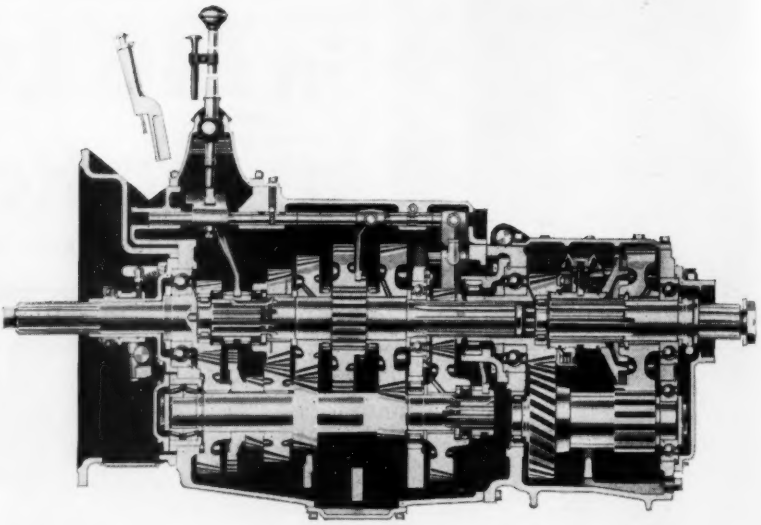


ROADRANGER® TRANSMISSIONS

for earthmoving and construction equipment

The Fuller 9-speed semi-automatic R-1150 ROADRANGER Transmission is designed specifically for tractors and trucks equipped with engines of up to 1150 cu. in. piston displacement, and developing up to 800 foot pounds of torque.

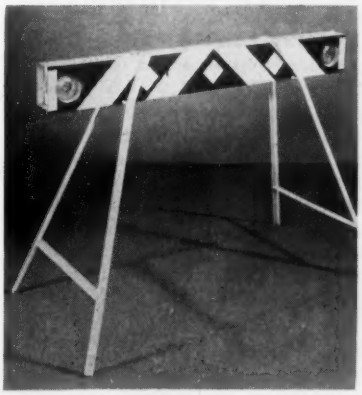
- No gear splitting—9 selective gear ratios are evenly and progressively spaced
- Easier, quicker shifts—38% steps between ratios
- One shift lever controls all 9 forward and 1 reverse speeds
- Engines work in peak hp range with greater fuel economy
- Less driver fatigue—1/3 less shifting
- Range shifts pre-selected—automatic and synchronized

See this cut-away R-1150 ROADRANGER at the ARBA Road Show in Chicago, at the Fuller Booth No. 221 (Section AA-Second Floor, Main Hall). Also on display at the booth—the 10-speed R-96 ROADRANGER, the 7-speed R-35 ROADRANGER, and the 10-speed 10-F-1220 heavy-duty transmission.

Fuller TRANSMISSIONS®

really where horsepower goes to work

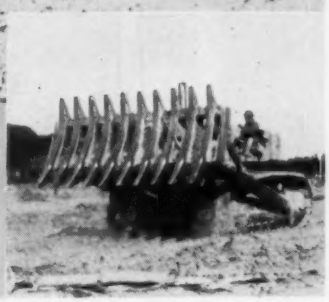
FULLER MANUFACTURING COMPANY
Transmission Division, Kalamazoo, Michigan



yellow or black and white. The unit employs a new electronic circuit principle that makes it virtually immune to bad weather. Even if the barricade is knocked over, the light will continue to flash. Cross bars on legs permit the barricade to be tied down or weighted. To make it tamper-proof, the light switch is concealed and the light itself is fastened inside the barricade. The standard model is 5 ft long, 3½ ft high, 2½ ft wide, and it weighs 37 lb. The units can be purchased or rented.—**Partronics, Inc., Dept H., 2421 Elmwood Ave., Buffalo, N.Y.**

VERSATILE WELDER—A new control system on Metal & Thermit constant voltage welders enables the operator to turn a dial and "tune in" the arc characteristics that will produce the soundest welds on different kinds and thicknesses of metals. Control of arc characteristics is now accomplished by means of a tapped phase-shift-

FLECO D9 RAKE



. . . helping D9 break its own records!

Announcing the heaviest rake ever developed – matching the power and ruggedness of the big Cat D9 Tractor. Designed for extra tough work such as taking out large boulders, clearing heavy growth, spreading rip-rap, piling and other construction applications. Features multiple spacing. Five, seven, nine or ten teeth can be evenly spaced across rake frame. Like the other Fleco Rakes, the big D9 Rake can boost the production of the Cat D9 Tractor. Specially designed cast manganese alloy steel teeth comb limbs, roots, trees and rocks from the soil, and stack material in dirt-free piles. Teeth are 6′ 4″ high and overall rake width is 14′ 6½″. Fleco D9 Rake for Cat D9 Tractor is available for either angle or straight dozer.

The new Fleco D9 Rake and other Fleco equipment will be on display at the Chicago Road Show. We invite you to visit our display.

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CORPORATION
Jacksonville, Florida

ROCK, ROOT & BRUSH RAKES
TREE CUTTERS • UNDERCUTTERS
CAB GUARDS • ROOT CUTTERS
DETACHABLE & PULL STUMPERS
TREEDOZERS • ROLLING CHOPPERS
HEAVY DUTY TOOL BARS

house footings

...HERE?

Right! – in spite of all the trees this Cleveland 110 is doing a fast job trenching for housing unit foundations

A highly maneuverable trencher is an absolute requirement for economical production to the accuracy required for building foundation trenches in conditions like these experienced by Algernon-Blair, Inc. of Montgomery, Ala. on this 127-unit housing project at Fort Eustis, Va. for the Corps of Engineers.

Here's what J. B. Snipes, Project Manager for Algernon-Blair, says about his Clevelands: "We are using Clevelands exclusively on the Fort Eustis project because of their excellent performance and dependability. We chose Clevelands originally because we consider them faster—and their superior maneuverability is a feature we particularly like on a project like this."

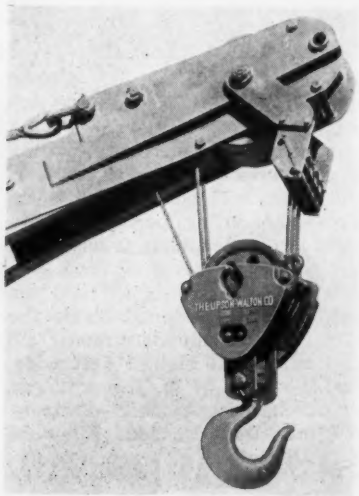
At the Road Show • Cleveland Trenchers and Backfillers • Exhibit 417

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

Good Everywhere

ing device. On the 300-amp model, above, a five position rotary switch is provided on the front panel. One position bypasses the control and the welder operates as a standard unit. But succeeding positions provide arc stabilization at decreasing loads to permit the operator to select the characteristics best suited to his job. Its principal advantage is that it permits a greater range of current density with a given electrode.—**Metal & Thermit Corp., 100 Park Ave., New York, N.Y.**



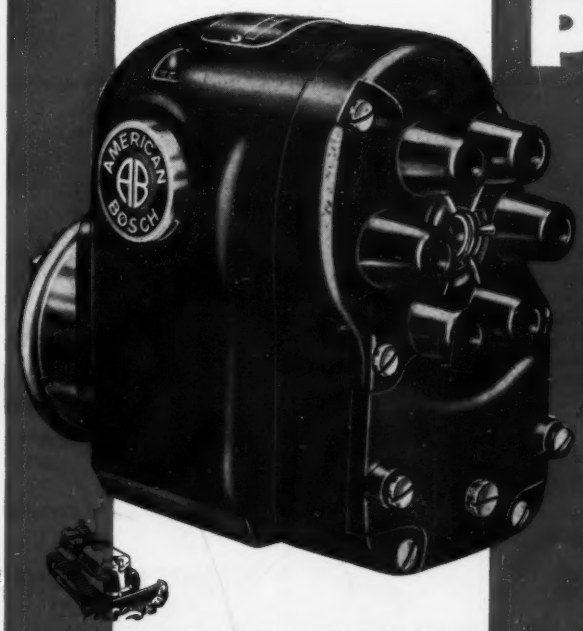
CRANE HOOK BLOCK—The new Max-Lift crane hook block is much shorter than conventional blocks, so that head room is increased. In addition to greater head room, the block provides roller or bronze thrust bearings that reduce the danger of twisting and damaging the hoisting lines. Larger sheave bearings give low bearing pressures. A drop-forged moveable steel trunnion eliminates the need for swinging the entire block into hooking position. A steel swivel hook can be rotated into hooking position for fast and easy connection. Alemite fittings with short channels contribute to make lubrication easy. Five to 30-ton capacities are available in six different models. — **Upson - Walton Co., Cleveland, Ohio.**

NEW PUMPS—A new series of portable, self-priming, gasoline engine-driven contractor pumps has been introduced by the Aurora Pump Div., of New York Air Brake Co. Called the series M, the five new models range in capacities from 105 gpm to 351 gpm. Inlet and outlet connections range from 1½

Right from the start . . .

FAST

POWERFUL



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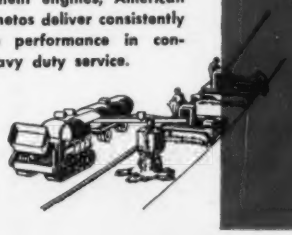
MAGNETOS

Fast, powerful—that's the power-packed story of American Bosch Magnetos—today's finest ignition units for construction industry engines. Many advanced features give these famous Magnetos greater power for split-second starting, PLUS the built-in stamina that assures years of constant, trouble-free service in construction engines. That's why they're so widely used as original equipment by so many leading engine builders.

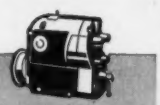
For your every replacement need, there's an American Bosch Magneto precisely engineered for maximum efficiency at all operating speeds and loads. Moreover, American Bosch can serve you well with all the advantages of one of the world's largest and most efficient Service organizations. There's an AB Service Agency near you. Write today for application data on your largest heavy duty engines right down to today's compact, high-speed power units. American Bosch, Springfield 7, Mass. A Division of American Bosch Arma Corporation.

FOR CONSTRUCTION INDUSTRY SPARK IGNITED ENGINES

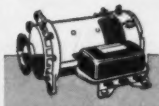
In dozers, gas-engine driven compressors, pumps, graders, paving machines and spreaders . . . wherever they are in use in Construction equipment engines, American Bosch Magnetos deliver consistently dependable performance in continuous, heavy duty service.



AMERICAN BOSCH



Automotive and Aviation Magnetos



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"Subway" is built with that *extra* measure of strength and durability that assures uninterrupted delivery of maximum air power to the drills, even when the "going" is roughest. Light weight, flexible, easy to handle. Specifications include oilproof tube; highest quality wrapped duck carcass; wear- and weather-resistant red rubber cover, with new criss-cross yellow stripe for positive identification. Sizes ½" to 1¼", I.D., in maximum lengths of 50 feet.

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"Allgood Cord" is made in sizes 1½" to 4", inclusive, in maximum lengths of 50 feet.

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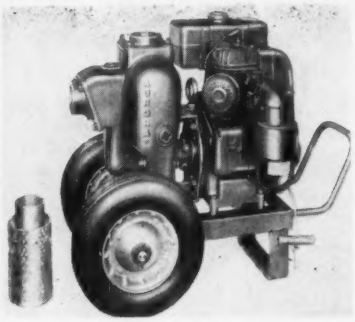
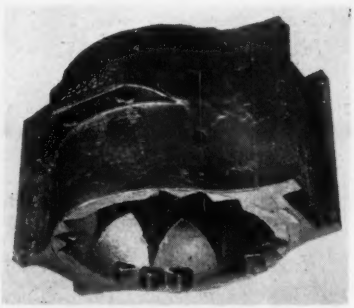


to 3 in. Pump and engine are mounted on a common base to make them more compact and more portable. The smaller units are equipped with carrying handles or spring-mounted pull skids and the larger models are available with carrying frames, steel wheel, and rubber-tired carriages. The new pumps are said to be quick priming and self cleaning.—**Aurora Pump Div., New York Air Brake Co., Aurora, Ill.**



ALL-PURPOSE CAP—Universal drive caps suitable for use with several different sizes and types of piles are now available for McKiernan-Terry diesel pile hammers. A single cap can be used to drive pipe, H-beam, or timber piles, and when a filler pad is added it can also handle concrete piles. Each drive cap is designed to operate with a specific size hammer in specific leads. The drive caps come in 11 sizes to fit the DE-20, DE-30, and DE-40 hammers in leads ranging from 6x20½ in. to 8x24½ in. They are fabricated of heat-treated and stress-relieved cast alloy steel. —**Pile Hammer Div., McKiernan-Terry Corp., Dover, N.J.**

CARBON REMOVER — Diesel smoke at the exhaust is usually an indication of poor combustion. One of the most common causes of such smoke is the accumulation of carbon and other sticky deposits in small amounts on plungers, meter-

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

FIRM C. H. LAWSON, INC.

Using RPM DELO Oil heavy-duty engines outlast equipment

C. H. Lawson, Inc. operates 78 pieces of road building equipment ranging from new to 15 years old, all using RPM DELO Oil. Only one engine has ever required major overhaul and that was not due to lubrication. Firm's chief mechanic, E. C. Miller, says, "RPM DELO Oil has been used exclusively in all our heavy duty engines since 1944. In many cases, it has enabled engines to outlast the equipment." Euclid Earth Mover (above) gets a push from a bulldozer to provide extra traction in wet earth.

TD 24 International (left), one of firm's 12 bulldozers, helps clear the way for a Route 50 by-pass at Riverdale, Maryland. This two year old tractor has operated more than 4,000 hours without engine repairs. Company owner, C. H. Lawson (right), reports that RPM DELO Oil keeps the engines in his equipment in such good shape that—regardless of operating conditions—they average approximately 4 years or 10,000 hours service before even minor repairs are required.

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrorosion of bearing metals
- Inhibitor resists crankcase foaming

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TRADEMARK "RPM DELO" AND DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

THE CALIFORNIA COMPANY, Denver 1, Colorado

READY for the $33 BILLION road building program

ATHEY-CATERPILLAR Rear Dump Trailer Units and ATHEY Loaders

ATHEY-CAT PR21-DW21

Athey-Cat Tractor-Trailer team is built for fast, easy loading; high speed hauling; quick, sure dumping. Handles 31 tons or 22.5 cu. yds. Articulated universal joint design permits 90°, non-stop turns in 33½′ diameter. 60° dumping angle provides clean gravity dump.

ATHEY-CAT PR15-DW15

Costs go *down*, profits *up* with the Athey-Cat PR15-DW15 team. Outfit handles 15.6 cu. yd, loads at speeds up to 31.3 MPH. Fast hydraulic lift, 60° dump sheds any material quickly and cleanly. 90° turns speed spotting, make maneuvering easier. Premium quality steels resist shock and strain of high speed hauling.

Fastest stockpile loader on the market! Patented full-floating feeder loads from stockpile or windrow, handling as much as 10 cu. yds. of cinders, stone, sand, gravel per minute or 25 cu. yd. of snow per minute. Swiveling conveyor loads up to 45° either right or left. Saves truck spotting time and assures fully crowned loads.

ATHEY 125 HILOADER

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PUSH BUTTON CONTROL
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...THE FIRST TRULY "HEAVY DUTY" VERSION OF THE SMALL ELECTRIC HOIST

Featuring:

- Push Button Control
- Self-Adjusting Heavy Duty Brake
- Sealed-in Lifetime Lubrication
- Overload Protection
- Fully Enclosed Components
- Lowest Headroom
- "CM-Alloy" Flexible Link Chain

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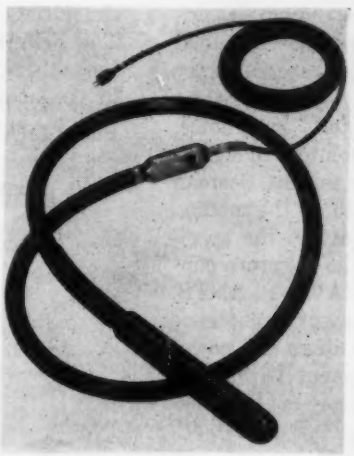
EQUIPMENT NEWS . . . Continued

ing and spray orifices, and other parts that affect injector operation or fuel spray. Manufacturers of a cleaner called Kleen-Flo say it keeps these parts free of carbon so that the exhaust runs clean. Eight oz. of the cleaner are added to 125 gal of fuel, and the engine is run for about 10 min.—**Kleen-Flo Co., 13021 Ventura Blvd., N. Hollywood, Calif.**



NEW VIBRATOR—A universal electric motor-in-head concrete vibrator is the second tool offered by Thor's new construction equipment div. The first was the T-29 power trowel, introduced last year. The new CV-2 vibrator is powered by a 115-v motor that gives the vibrating head speeds of 15,000 rpm without load and 12,000 rpm in 2-in. sump concrete. The motor is triple-insulated against heat and heavy loads, and thermal controls automatically shut off current in case of overloading. Three models are available: the CV2-10 with 10 ft of hose; CW2-20 with 20 ft of hose, and CV2-210 with 10 ft of hose at each end of the switch. All models include a 25-ft electric cable.—**Thor Power Tool Co., Aurora, Ill.**

HANDLES BIG YARDAGE—Working at a constant 10,000 rpm, the Homelite High-Cycle vibrator will handle 30 to 40 cu yd of 2-in. slump concrete per hr, according to the manufacturer. The vibrator operates from a 130-lb, 2500-w generator that can be placed in any convenient spot within a 400-ft radius. To reduce maintenance requirements, the vibrator motor has no brushes or commutator. The motor runs at a constant speed even

Crane Operators,
SAVE LIVES AND EQUIPMENT
with this safety device with a thousand uses

A Martin-Decker crane weight indicator can convert your crane into a mobile weighing device.

The SB-10 crane weight indicator tells you the weight you are lifting, the boom radius, and the lifting capacity at each radius. Big 12-inch dial. Capacities to 200,000 pounds.

The SC-6 is an inexpensive instrument that indicates weight only. It has a six-inch dial and is calibrated in capacities up to 50,000 pounds.

WEIGH IT AS YOU LIFT IT

Martin-Decker crane weight indicators are completely hydraulic. They are actuated by pressure transformers installed on the dead ends of the reeving systems.

You can use your Martin-Decker crane weight indicator as a safety device and gauge whether you are approaching the danger mark before you even lift your load free of the surface. Or you can use it to prevent truck overload fines, or any of many other uses applicable to your particular operation.

For further information, contact your nearest Martin-Decker distributor or write Martin-Decker Corporation, 3431 Cherry Ave., Long Beach 7, Calif., Dept. AC-19.

MARTIN·DECKER

27 Seaman-Andwall Trav-L-Plants Ach Uniformity in AASHO Sub-Base Sta

Global interest shown as AASHO sets construction pattern for

Highway officials, engineers and contractors from all parts of the world have been watching the most rigidly controlled road construction experiment ever attempted. AASHO engineers demanded undeviating uniformity in the sub-base of every test section. All equipment had to prove its performance beyond question before acceptance. And all equipment had to be absolutely identical. After competitive test with other mixers, Seaman TRAV-L-PLANTS were selected to do the mixing, the blending of soil particles to attain the specified 95% densities and to bring the moisture content of the fill to optimum. 27 TRAV-L-PLANTS, all equipped with pumping equipment, volumetric meters, spray bars, underbody scarifiers and power steering kept the moisture increment within the tight 2% tolerance demanded.

The stiff clay used in the sub-base stabilization made the job of fast, uniform mixing impossible in the initial experiments made with other equipment. The SEAMAN-ANDWALL TRAV-L-PLANT, on the other hand, demonstrated great superiority in the attainment of the exacting uniformity.

Each TRAV-L-PLANT towed its own water supply because tank trucks were not allowed on grade. 1000 gallon wheel mounted tanks were attached

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AASHO TESTS PATTERN FUTURE HIGHWAY METHODS

Sub-grade stabilization, once the most neglected phase of modern highway construction, has come of age. The most recent proof of this comes from LaSalle, Illinois, center of the most ambitious experimental highway construction programs in the nation's history. The American Association of State Highway Officials; all 48 states; the territories of Hawaii, Puerto Rico and the District of Columbia and the Highway Research Board are participating in the construction of this significant test facility. The AASHO test road will be in the nations road building spotlight for many years to come. The painstaking control exercised by AASHO engineers; the precision and perfection of new road building methods and the high speed equipment that was used, will certainly be studied and specified on many thousands of miles of new construction. The techniques and operations adopted at the AASHO test road may well become standard operating procedure on all roads of the future.

SEE THE ROAD SHOW

BE SURE TO SEE THE SEAMAN-ANDWALL EXHIBIT
AT THE ROAD SHOW, SECTION A, BOOTHS 320 AND 323

S-A

SE

nts Achieve Unparalleled se Stabilization Tests

ern for nation's highway program

at the side of the TRAV-L-PLANTS by an outrigger device.

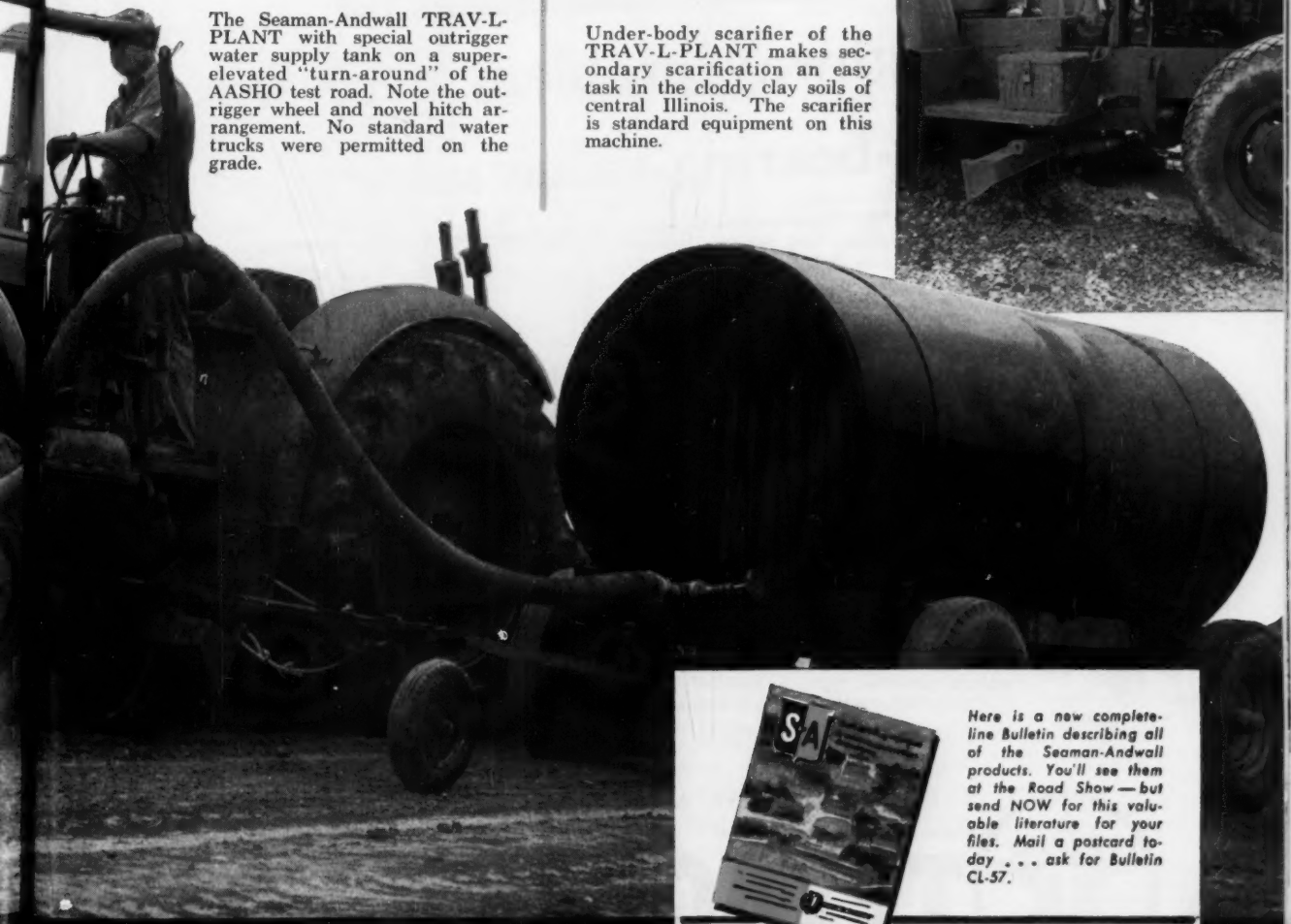
SEAMAN-ANDWALL TRAV-L-PLANTS through their superiority established in the gigantic AASHO experiment have again won recognition and approval as standard equipment in base and sub-base stabilization in the National Highway Program.

Successful bidders for the sub-grade work were the S. J. Groves and Sons, Co. of Minneapolis and the Arcole Midwest Construction Co. of Skokie, Illinois.

A caravan of four TRAV-L-PLANTS on the straightaway of the AASHO test road. It is high production like this that completes the sub-base stabilization work on time. A total of 27 such units were on the job.

The Seaman-Andwall TRAV-L-PLANT with special outrigger water supply tank on a super-elevated "turn-around" of the AASHO test road. Note the outrigger wheel and novel hitch arrangement. No standard water trucks were permitted on the grade.

Under-body scarifier of the TRAV-L-PLANT makes secondary scarification an easy task in the cloddy clay soils of central Illinois. The scarifier is standard equipment on this machine.



Here is a new complete-line Bulletin describing all of the Seaman-Andwall products. You'll see them at the Road Show — but send NOW for this valuable literature for your files. Mail a postcard today . . . ask for Bulletin CL-57.

Stabilizing the World

SEAMAN-ANDWALL CORPORATION

A Division of American-Marietta Company

Dept. R-210

MILWAUKEE 1, WISCONSIN

Laying hot-mix Texaco Asphaltic Concrete wearing surface over a sand-shell base and sand-loam sub-base on 19 miles of Texas State Route 73.

CONTRACTORS

F. & C. Engineering Company, Inc., Houston, prime contractor.

Gulf Bitulithic Company, Houston, asphalt contractor.

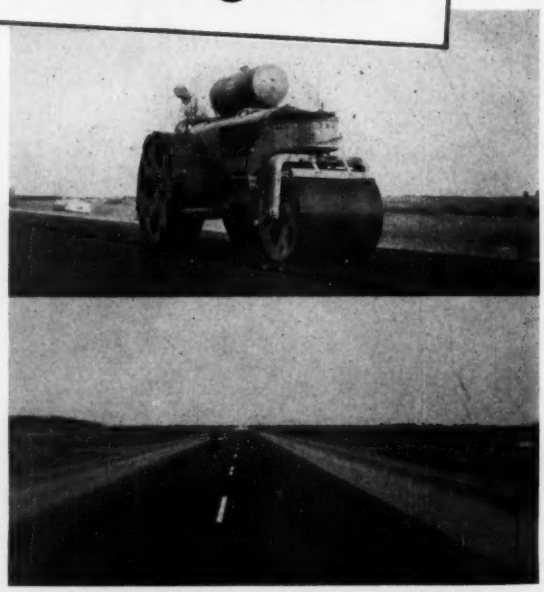
The highway problem here was a low-bearing-value subgrade

Texas is building a shorter highway link between Houston and Port Arthur's large oil refineries. A major problem in the construction of the 19-mile section shown here was the low bearing value of the underlying subgrade.

The answer to the problem was a completely flexible highway, from the subsoil up. Selected material, sand-loam, was laid to a thickness of 12 inches on the subgrade. Next came a sand-shell base 10 inches thick, primed with Texaco MC-1 Cutback Asphalt. A 2-inch wearing surface of hot-mix Texaco Asphaltic Concrete completed the project.

The top-to-bottom flexibility of such a highway assures complete and continuous contact with the subgrade, resulting in greater durability and lower upkeep cost.

Whether the project is a State Highway in Texas, a landing surface for guided missiles in Florida, or a heliport for military helicopters in Virginia, there is a type of Texaco Asphalt construction exactly suited to the requirements. Helpful information on methods and materials recommended for all asphalt pavement types is supplied in two booklets. Copies may be secured without obligation by writing our nearest office.



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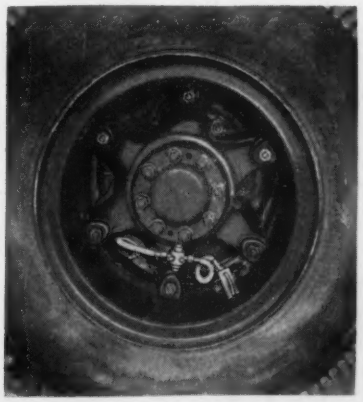
TEXACO

TEXACO ASPHALT

when fully loaded. Tough neoprene-covered hose is standard, and for deep forms 7-and-10-ft extension hoses are available.—**Homelite, Port Chester, N.Y.**

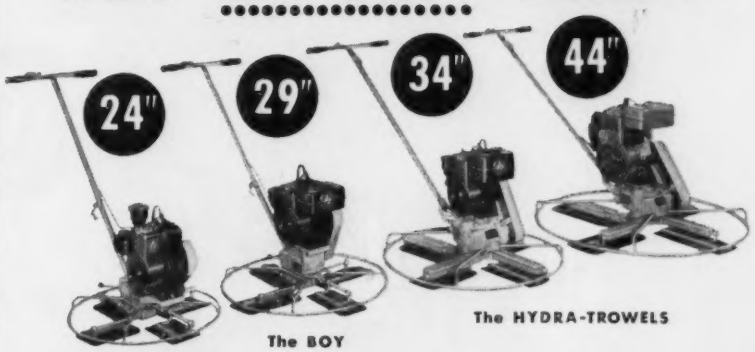


CUTS TIRE WEAR—The Carlan valve is designed to equalize pressures between a pair of dual tires so that each tire is prevented from absorbing more than its required share of the load. The action of the valve is constant and automatic. If one tire starts to build up extra pressure, air is transferred through the valve to the other tire until the pressures are again equal. Installation of valve is simple, and either tire may be inflated independently. A safety shutoff is provided in case of a flat or a blowout. —**Carlan Instruments Co., Inc., 1375 Park Ave., Cranston 9, R.I.**

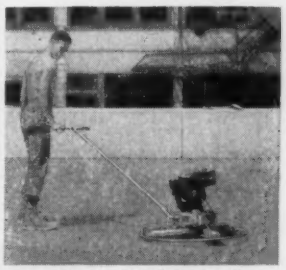
CAR DESK—This gadget, called the Travel-Desk, holds note paper, maps, drawings, or time sheets so that they are instantly available to the driver of a car. When not in use, the Travel-Desk swings under the dashboard, out of the way. It can be installed in minutes, with-

Kelley POWER TROWELS

for EVERY Job!



The BANTAM The BOY The HYDRA-TROWELS



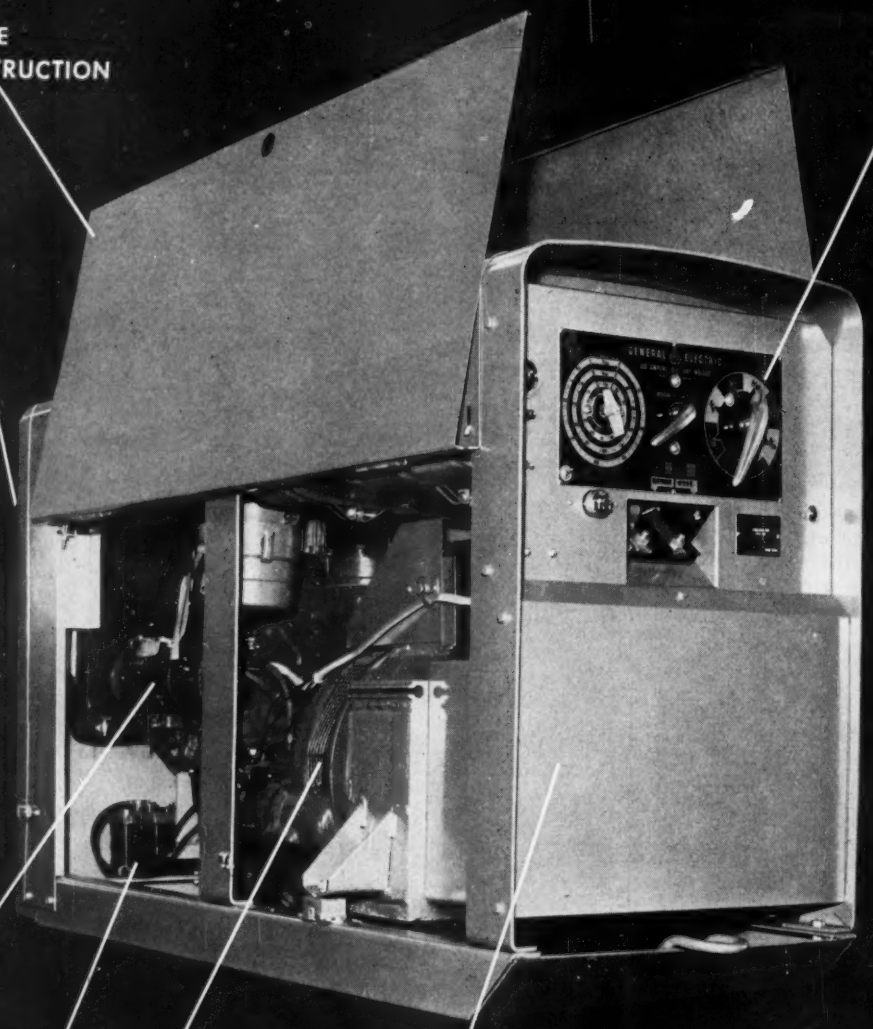
LOOK! ONE HAND!
Low center of gravity makes Kelley trowels stable, easy to operate. No pulling or tugging. No gyrating. You never have to "fight" a Kelley machine.

LOOK! ONE HAND!
Imagine...down a ladder with one hand! That's what you can do with the light, easy-to-carry BOY and BANTAM. So compact you can put it in the trunk of your car.

Here's the BIG, NEW Kelley line, the best power trowels on the market! For the big jobs...two easy-operating HYDRA-TROWELS, 34" and 44", with the exclusive Kelley hydraulic action. A flick of the finger on the control lever sets the 4 dual-purpose blades for floating or finishing any type of floor finish desired. For the smaller jobs...the Kelley BANTAM, 24", and the Kelley BOY, 29". Small for portability and bears for work!

Kelley machines are unmatched for their easy operation. Low center of gravity assures stability, prevents gyrating. All Kelley machines have 4 big, dual-purpose blades for both floating and finishing. Stationary guard ring works right next to walls and makes carrying easy. But above all, Kelley machines put quality, hand-troweled finishes on your floors without back-breaking drudgery.

Kelley **MACHINE DIVISION, Wiesner-Rapp Co., Inc.**
283 HINMAN AVE., BUFFALO 23, N. Y.
Please send me information on the
☐ HYDRA-TROWELS ☐ BANTAM ☐ BOY
NAME _____
STREET _____
CITY _____ ZONE _____ STATE _____



NOW—AVAILABLE IN 200-, 300-, 400-AMP MODELS

Prove it to yourself— Make this actual feature-by-feature comparison of General Electric engine-driven welders with two other lines of engine-driven welders. You will see that only the new G-E welders have so many advanced design features for better welding at lower cost.

EASILY PRESET Electrode Selector, Current Dial—Dual controls make current setting easier and more accurate.

GENERAL ELECTRIC	✓	
MANUFACTURER A		
MANUFACTURER B		

How General Electric's NEW Line of Engine-driven Welders Can Help You Meet Contract Deadlines

Advanced design assures less "downtime," minimum maintenance—for faster, lower-cost welding

Nothing stretches out construction time more than unreliable or obsolete equipment. Such equipment increases your maintenance costs and results in nonproductive "downtime." It may even lead to contract fines and loss of repeat business.

To reduce construction delays, General Electric's new line of engine-driven welders has been designed and field-tested for maximum durability and minimum maintenance—without sacrifice in performance. These new 200-, 300-, and 400-amp welders save for you with the following advantages:

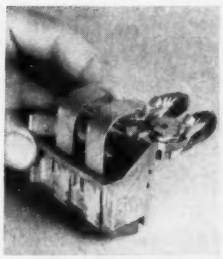
SAVE YOU TIME—Sturdy construction, the dependable Hercules engine, new-design generator, and simplified control all combine to give you steady output, longer operating time between overhauls, and reduced maintenance. This means more production per machine . . . per man-hour.

SAVE YOU MONEY—General Electric engine-driven welders begin saving you money the first day on the job. For example, the deep-sump crankcase provides complete lubrication to all moving engine parts—up to a 15-degree tilt in any direction. This helps to reduce costly breakdowns. And the over-all advanced design assures you of more and better welds at less cost, with a reduction in costly downtime for maintenance and repair. Additional General Electric advantages are described below.

For more information about how General Electric engine-driven welders can help you, contact your nearby General Electric Welding Distributor. He is listed in the yellow pages of your telephone book. Write for descriptive bulletin to Section 714-5, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

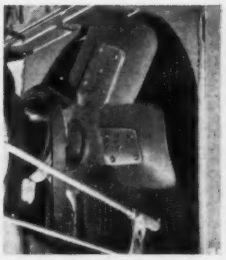
GENERAL ELECTRIC



CONSTANT-PRESSURE Brush Springs—Right pressure maintained for life of generator brushes without adjustment.

PRELUBRICATED Generator Bearings—Ball bearings prelubricated with sufficient grease for years of service.

DEPENDABLE Geared Governor—Gear-driven governor maintains close speed regulation for best welding.



PUSHER-TYPE Engine Fan—Large diameter pusher-type fan circulates ample cooling air for engine and generator.

CONTROLLED CURRENT Peaks—Current peaks are controlled. Arc can be crowded with no "stumbling" or "freezing."

	✓	✓	✓	✓	✓
		✓	✓	✓	
				✓	

New Optical Plummet Built into Gurley Transit Saves Set-up Time, Improves Accuracy on Windy Days

Years ago, Gurley introduced lightweight instruments to combat wind vibrations. Now Gurley further beats the wind problem with an optical plummet *built into* the instrument.

The new Gurley Optical Plummet Transit eliminates swing and sway of the cord and plumb—always time-consuming and exasperating on a windy location, and inaccurate as well. Positive accuracy of set-up is assured with the Gurley Optical Plummet.

The new Gurley transit is furnished with a tripod with built-in shifting head, and allows a two-inch shift of the instrument over the point. This provides greater latitude in initial set-up.

Gurley's new Optical Plummet Transit offers one of the advantages of the optical-reading theodolite *plus* the desirable features of simplicity and universal acceptance of the American transit. For further details, write for Bulletin OP-57.

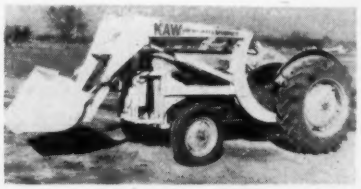
GURLEY

W. & L. E. GURLEY, 521 Fulton Street, Troy, N. Y.

Gurley—Since 1845

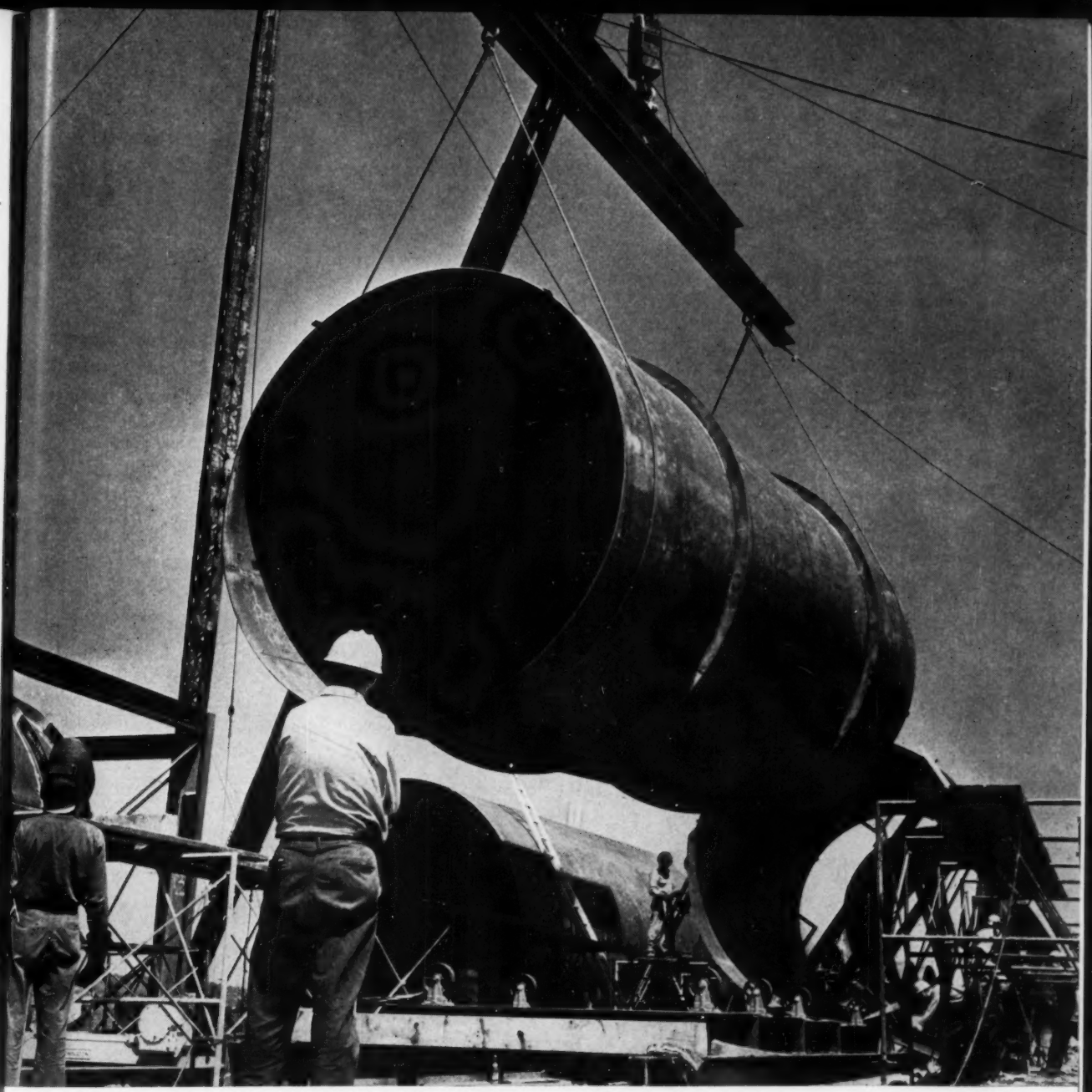
EQUIPMENT NEWS . . . continued

out drilling, and four screws keep the 6¼x10-in. clip board level, whatever the dashboard angle. A paper pad and a mechanical magnetic pencil are included. It is available for $3.75 from **General Industrial Co., 5742 N. Elston Ave., Chicago, Ill.**



FORD AND FERGUSON LOADER—Shawnee has introduced a new loader for the Ford and Ferguson utility wheel tractors. Called the Kaw loader, it has a 10-cu-ft rollback bucket actuated by twin 2-in. cylinders. Lifting cylinders have 2½-in. bores, that will raise 1250 lb to a 9-ft dumping height. According to Shawnee, the operating cycle for the loader is 5 sec to full dumping height and 3 sec to down position. Simple two-pin installation makes it easy to attach and remove. The hydraulic system includes an 11-gal crankshaft-driven pump with by-pass protection.—**Shawnee Mfg. Co., 1947 N. Topeka Ave., Topeka, Kan.**

EQUIPMENT HAULER—A trailer that utilizes landing gear-type hoists to lower and raise the gooseneck has been developed by Rogers Bros. Corp. The hoists are said to facilitate quick attachment or reattachment in only a few minutes' time. With the front of the frame lowered to the ground, equipment can be loaded or unloaded with little or no blocking. The new trailers are available in capacities of 15, 20, 25, 30, and 35 tons.—**Rogers Bros. Corp., Albion, Pa.**



Wire Rope at Work—At Hawley, in the beautiful, rolling Pocono Mountains, is a big hydroelectric plant operated by the Pennsylvania Power & Light Company. Thirty or more years ago, PP&L constructed a wood-stave flow line connecting the plant to the Lake Wallenpaupack dam, 3½ miles away. Approximately 8500 ft of this system was recently replaced with a huge steel pipe line, 14 ft 8 in. in diameter. The photograph shows one stage of construction work.

Lifting the ponderous fabricated pipe was a job in itself. But with Bethlehem wire rope handling the principal lifts, the task of moving the heavy sections was managed smoothly. It was the type of job that this strong, tough rope always takes in stride, no matter how heavy or cumbersome the load.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

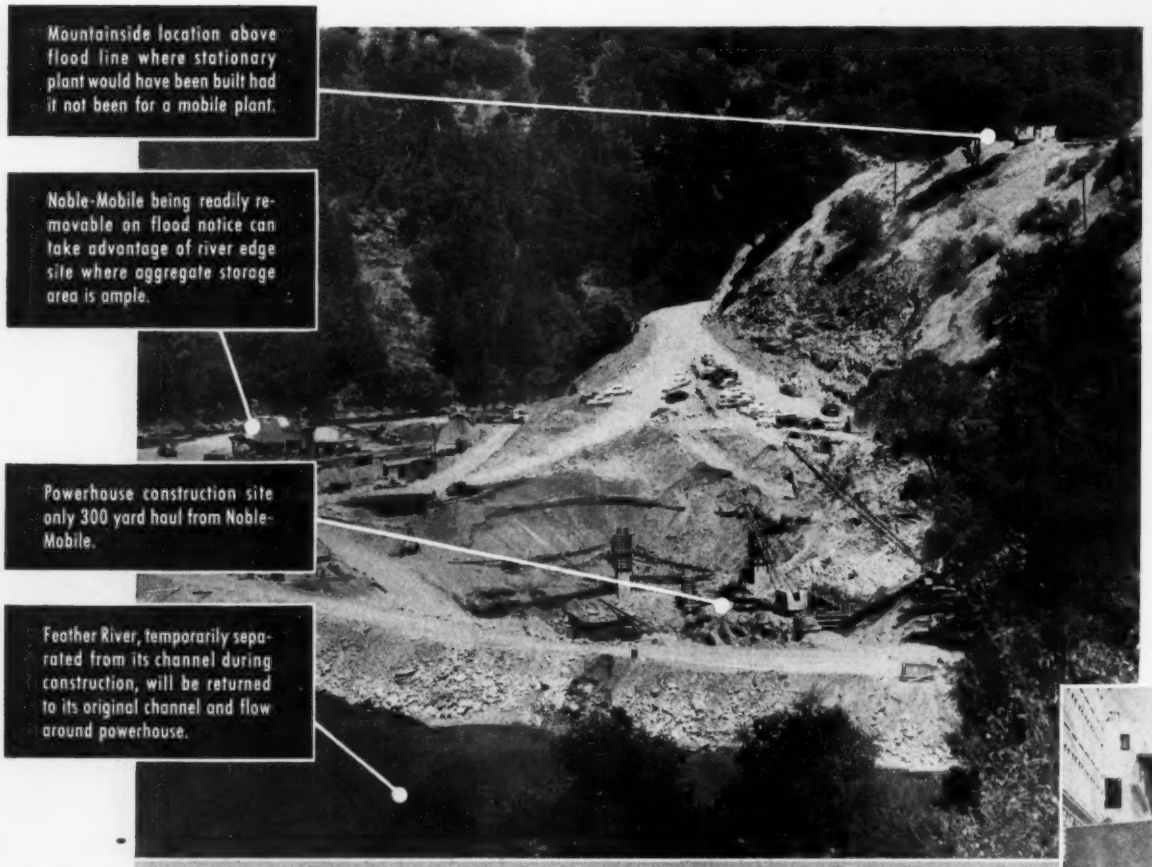
Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:
CONSTRUCTION • EXCAVATING • MINING • QUARRYING • PETROLEUM • LOGGING • MANUFACTURING

BETHLEHEM WIRE ROPE
BETHLEHEM STEEL

How NOBLE-MOBILE solved flood

Flash floods that could wash away a fixed batching plant installation were a threat at the site of the powerhouse construction by the Bechtel Corporation for Pacific Gas & Electric Company on the Feather River, California. A gravel bar at the river edge was the logical site for a concrete batching plant because it was the only place with sufficient area for aggregate storage. Yet, with flood danger, the only practical alternative site was a point 110 ft. up the canyon wall off the Western Pacific Railroad right-of-way. A stationary plant there would have required extensive concrete foundations and a major earthmoving job to level an area of sufficient size to store aggregates. The site also would have entailed transit truck hauls under all weather conditions down a steep grade.

Noble-Mobile made the mountainside installation unnecessary. This batching plant on wheels was put into operation at the river edge as it could be hauled out to high ground on only a day's notice of flood. The mobility permitted scheduling work for 12 months a year so that the job could be completed by 1958. Noble-Mobile saved 70% in installation costs as against a stationary, mountainside plant. On this project, Noble-Mobile normally has to operate only 50% of the working day in order to provide the 25,000 yards of concrete that ultimately will be used. The batch is hauled by transit trucks to the construction site only 300 yards distant.


Mountainside location above flood line where stationary plant would have been built had it not been for a mobile plant.
Noble-Mobile being readily removable on flood notice can take advantage of river edge site where aggregate storage area is ample.
Powerhouse construction site only 300 yard haul from Noble-Mobile.
Feather River, temporarily separated from its channel during construction, will be returned to its original channel and flow around powerhouse.

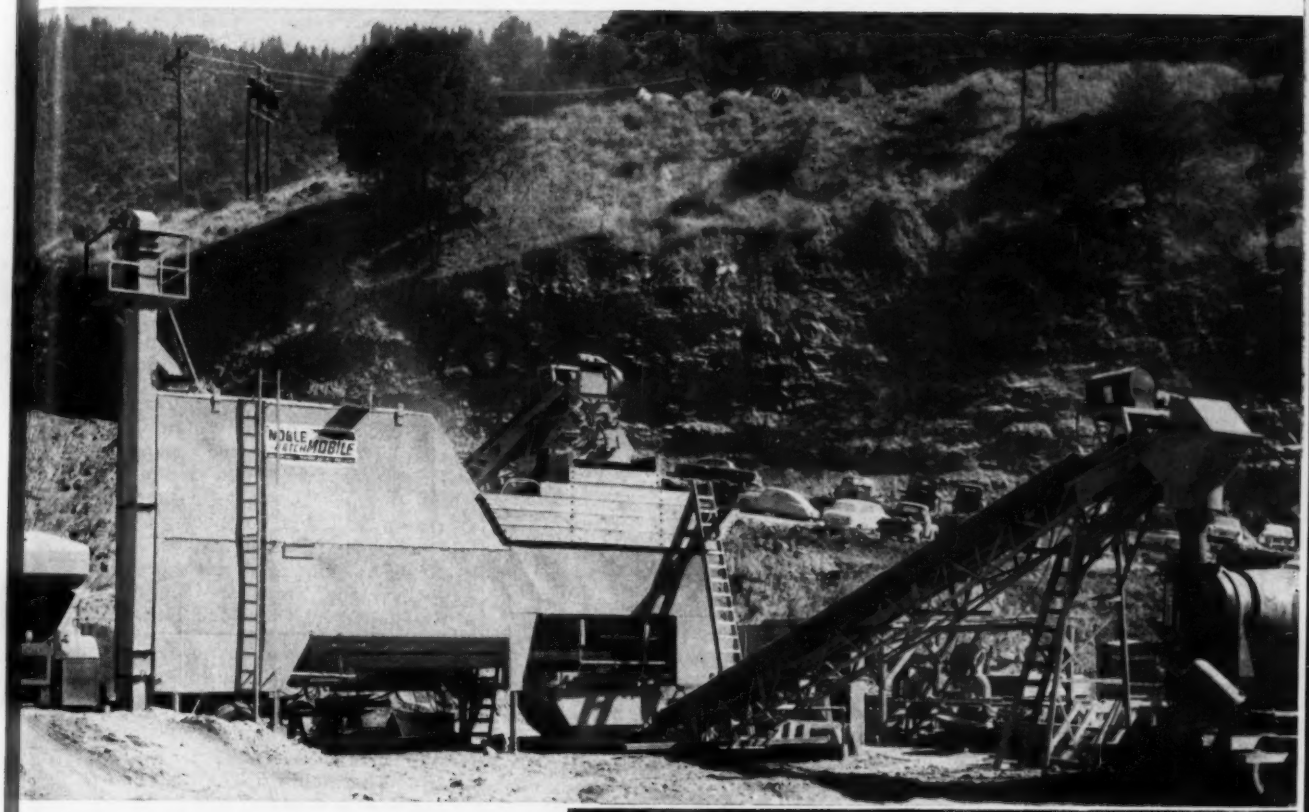
View of construction of semi-outdoor powerhouse designed to withstand the damaging effects of flood. Outside dimensions will be 175 ft. by 116 ft. by 87 ft. high. Construction area has been separated from the river course by a low temporary levee around the area for the period of the construction. The foundation of the plant is at the bottom of an excavation to a depth of 51 feet below the river surface. On completion of the project, the river will be returned to its original channel. 36 ft. of the powerhouse will extend above the normal river level.

NOBLE-MOBILE Batchmobile
Covered by patents pending

WRITE FOR CIRCULAR

THE NOBLE COMPANY • 1860 - 7TH ST., OAKLAND 20, CALIF. • TEMPLEBAR 2-5785
Branches: 20950 Center Ridge Road, Cleveland 16, Ohio. EDison 1-3426
518 First Ave. North, Seattle, Wash. MUtual 4878
218 Richmond St., El Segundo (Los Angeles), Calif. EAstgate 2-4518
International Sales Agent: Frazar International Corp., San Francisco

problem and saved 70% in installation cost



NOBLE-MOBILE BATCHING PLANT

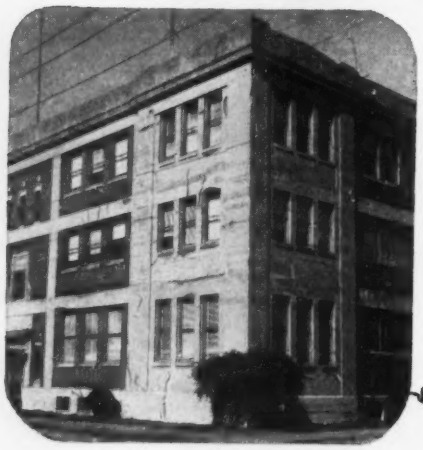
supplies concrete to transit trucks. May also be used for dry batch or pre-mix. Has bulk cement storage silo with truck hopper unloading screw and elevator. Weighs aggregates and cement separately and simultaneously. Automatic or semi-automatic control. No field wiring, concrete foundations or crane time required on base plant.

Noble-Mobile is driven to the job site and goes into production promptly. Purchase is easier to finance than stationary plant.

1,000 yards of 2½", 1½", ¾" aggregates and sand, hauled by truck from Oroville 25.1 miles away, are stored in compartmented piles at the site. They are fed by a scooploader to a conveyor leading to the plant. The materials are automatically batched and discharged by a conveyor to the transit trucks for the approximate 2-minute haul to the pouring site.

DISTRIBUTORS: BIRMINGHAM, ALA., Equipment Service Co. • PHOENIX, ARIZ., Superior Equipment Co. • VANCOUVER, B. C., Westcoast Equipment Co., Ltd. • DENVER, COLO., Western Machinery Co. • BALTIMORE, MD., General Supply & Equipment Co., Inc. • CEDAR RAPIDS, IOWA, James W. Bell Co. • INDIANAPOLIS, IND., Manwaring Machinery Co. • DETROIT, MICH., R. G. Moeller Co. • ST. PAUL, MINN., Borchert-Ingersoll, Inc. • CLEVELAND, OHIO, Wepco Equipment Co. • LOS ANGELES, CALIF., Smith-Booth-Usher Co. • PORTLAND, ORE., Clyde Equipment Co. • PHILADELPHIA, PA., Furnival Machinery Co. • PITTSBURGH, PA., Equipment & Supplies, Inc. • AMARILLO, TEXAS, Plains Machinery Co. • DALLAS, TEXAS, North Texas Equipment and Supply Co. • HOUSTON, TEXAS, Boehck Engineering Co. • EL PASO, TEXAS, Border Machinery Co. • WACO, TEXAS, Richards Equipment Co. • SAN ANTONIO, TEXAS, Contractors Machinery Co. • SALT LAKE CITY, UTAH, Arnold Machinery Co. • SEATTLE, WASH., Star Machinery Co. • SPOKANE, WASH., Intermountain Equipment Co. • CASPER, WYOMING, Studer Tractor & Equipment Co. • MONTREAL, QUE., Laurentide Equipment Co., Ltd. • WINNIPEG, MAN., Huggard Equipment Co., Ltd. • BOSTON, MASS., Hedge & Mattheis Co. • LOUISVILLE, KY., Emmett C. Watson Co. • NASHVILLE, TENN., Peterson Machinery Co.

THORITE and THOROSEAL furnish office building with *That New Look* plus all-weather protection.

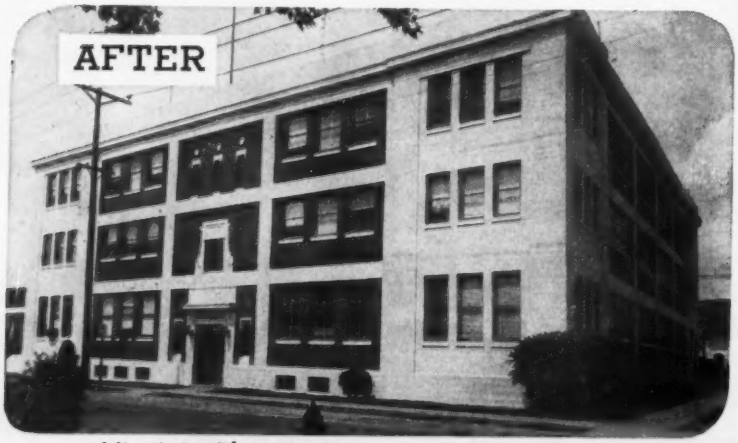


BEFORE

Severe weathering had deteriorated sections of cornices, sills, lintels and ledges. Cracks permitted water penetration, causing damage to interior of building.

All cracks were opened with hammer and chisel, spalled areas cut and cleaned, then patched with THORITE, followed by two brush coat applications of Pearl Gray THOROSEAL.

Brick was left uncoated to develop pleasing contrast. See Circulars No. 16 and 20.



Virginia Electric & Power Company
Richmond, Virginia

THORITE ***NONSHRINK PATCH*** 20 minute set patching mortar

THOROSEAL ***MASONRY SEALER*** seals masonry walls against water and beautifies surface

"How to do it" GET OUR 16 PAGE BROCHURE

STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PENNA. CENTERVILLE, IND.

New Publications

These catalogs and bulletins from manufacturers contain useful information about construction equipment and materials. To obtain a copy, write directly to the manufacturer at the address given.

THREE - WAY MACHINE — The Cleveland 80W—a multi-purpose machine for the construction and utilities fields—is the subject of a new 12-p, two-color bulletin. A fast backfiller, the one-man-operated 80W is also a good pipelayer. It features a 30,000-ft-lb capacity side crane. Its rugged tamper is also a valuable compaction tool. Twenty-eight action photos show the rig working at a variety of jobs. **—Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, O.**

CONTRACTOR'S PRODUCTS — Twenty-three products for the construction industry are described and illustrated in a new catalog published by the Industrial Rubber Div., Thermoid Co. The 12-p manual gives application data construction details, and specifications on three types of conveyor and elevator belting; 14 types of air, water, steam, and welding hose, and various types of brake lining and blocks manufactured by Thermoid. **—Thermoid Co., Trenton, 6, N. J.**

SLING ASSEMBLIES—A new catalog on chain slings and chain sling fittings and accessories has been published by Republic Steel. Printed in two colors, the 42-p catalog is illustrated with drawings and diagrams that explain the terminology of chain slings and how they can be used with maximum safety, service, and economy. Chain slings covered include single, double, triple, and quadruple types, plus a variety of other special types. The book also includes sections outlining the proper use and care of chain slings.**—Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.**

VERSATILE COMPACTOR — A new illustrated bulletin describes the many ways the six compacting units in the workhead of Jackson's multiple compactor can be arranged and rearranged to provide the most efficient coverage and

Lick steep grades, spongy footing

build road-approach to Arkansas levee

Pulling 6½-yard loads uphill, over soft ground, 2 D Tournapulls with sideboards helped rebuild 2½ miles of Arkansas State Highway 1—from Pendleton north to the Arkansas River levee. Graves Brothers Co., of Pine Bluff, Arkansas, handled the dirtmoving for Linwood Smith, prime contractor to State Highway Dept.

Because of the length of haul and poor footing, Graves Bros. sent the 2 "D's" to build an inclined approach where Route 1 joins the levee. Short haul cut-and-fill work, in generally level terrain and sandy ground, was handled by a crawler-drawn scraper. Two graders (one an Adams 550) spread fill and regraded the 2½-mile stretch of road.

Up and down the levee-side

Tournapulls loaded in a bottom-land ditch at the foot of the levee. Pushed by a crawler-dozer, 138 hp "D's" heaped 6½ yards of sandy clay in an average 54 seconds, in 50 to 75 feet. After a 675′ uphill haul to the top of the levee, dirt was spread over 75 feet in 20 seconds. Tournapull's big low-pressure tires and exclusive power-transfer differential pulled loads through soft, slippery spots without loss of time or yardage. Downhill return to the borrow completed a 1500′ cycle.

"Handles fine on slopes"

Superintendent W. A. Cassity is well pleased with the way his "D's" worked the steep, Route 1 job. His records show the two rigs were consistently moving 185 to 200 loads in ten 54-minute hours. Cassity says, "These LeTourneau-Westinghouse D Tournapulls are good all-around dirtmoving machines."

Says operator H. R. Stephens, "I like Model D's 30 mph speed, and the maneuverability of electric steering. Rig is easy to handle, simple to maintain. It handles fine on steep slopes because it's powerful, low, and well-balanced."

157 miles in 6¼ hours

According to Supt. Cassity, the "D's" averaged better than 25 mph in traveling 157 miles over state roads, from Parkin to the job at Pendleton, Arkansas. On this trip, one Tournapull towed a trailer toolhouse, the other an extra 4-wheel trailing scraper.

Tournapull versatility

You'll find D Tournapull completely fills your needs for a fast, flexible, self-propelled scraper. It works economically on big jobs and small, over long or short hauls. In addition to general earthmoving work, "D" cuts ditches, shapes backslopes, fine-grades, builds road shoulders, spreads gravel, handles clean-up. With optional blades or other attachments, rig dozes, back-fills around buildings and culverts, plows snow, and does a host of other handyman chores.

Improved "D" moves more dirt

To help you move more dirt, faster, the improved D Tournapull now has increased capacity of 9 yds. heaped, 8′ width, and permissable axle-load . . . requires no special road permit. Call or write for details.

D Tournapull with sideboards spreads 6½-yard load of sandy clay on roadway approach, as second scraper returns to bottom-land loading area out of camera range.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-1037-H-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

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It takes U. S. Royal Cord (the air hose built like a tire) to handle jobs like this—to take the worst kind of punishment *wherever* air lines are used. The cord construction increases resistance to internal pressure, yet produces a hose of extreme flexibility. U. S. Royal Cord has remarkable resistance to blows or bruises caused by blasting, or by heavy tools falling on the hose or by trucks and other vehicles running over it. *Never needs cribbing.* Its smooth, brown cover is the *toughest* ever put on a molded hose. No matter how great the shock, no matter how excessive the pressures on any job, U. S. Royal Cord is the *quality* air hose that pays off—in jobs performed and in long life. It proves that it never pays to buy cheaply-constructed hose.

U. S. Royal Cord Air Hose is obtainable at any of the 28 "U. S." District Sales Offices, at selected "U. S." distributors, or by writing U. S. Rubber, Mechanical Goods Division, Rockefeller Center, New York 20, N. Y.

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Practical House Carpentry

Clear, practical guide to house building, giving fundamentals and methods in a step-by-step, well-illustrated manner. Shows how to use hand and power tools, how to select and make joints. Covers every step in constructing a one-story residence, from driving the first layout stake to installation of hardware. Gives methods that are simple and will produce craftsmanlike work. **By J. D. Wilson, 360 pages, 253 illustrations, $5.50.**

Estimating Construction Costs

Practical help for making accurate estimates on engineering projects—covering materials, labor, equipment, overhead, and profit for each type of material. Over 100 time-saving tables give approximate man-hours of work. Tables also show the costs of owning and operating or renting many types of construction equipment based on hourly rates. **By R. L. Peurifoy, Prof. of Const. Engrg. A & M Col. of Texas. 315 pages, 60 illustrations, 107 tables, $8.00**

Plain Concrete

A sound guide to modern methods in producing and using concrete. Every important phase of concrete technology—from preparing specifications to supervising construction, and testing concrete and concrete materials—is fully covered. When you run into an unfamiliar situation—when you want to check a specification, etc., refer to this guide and find the right answer quickly and easily. **By E. E. Bauer, Assoc. Prof. of Civil Engr., U. of Ill. Third Edition, 441 pages, $7.50.**

PROFESSIONAL ENGINEER'S EXAMINATION QUESTIONS AND ANSWERS

Over 500 questions and complete answers to help engineers pass state license examinations. Covers mechanical, electrical, civil, and chemical engineering, and includes engineering economics and land surveying. Latest questions—suitable for all states. Author has worked on New Jersey examination preparation for 19 years. By William S. LaLonde, Jr., 462 pp., 234 illus., $6.50.

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consolidation of granular soils, rock, slag, sand, or gravel. The flexibility of the compactor is derived from the fact that each unit of the workhead can be independently operated. This permits the working width of the machine, normally 13 ft 3 in., to be reduced until it suits exactly the width of the project. The units may be arranged in tandem, three following three, three and two staggered, and they can be towed in tandem at the side of the tractor for certain jobs, such as pavement widening projects.—**Jackson Vibrators, Inc., Ludington, Mich.**

EXTRACTS WATER—The Vacuum Concrete Process, a system that mechanically extracts water from concrete immediately after placing it in the shuttering, is now being used for engineered construction as well as for building construction. The new method is said to provide easier placing of concrete because greater plasticity is possible; reduced shuttering time; improved compaction; and resistance to frost action both at an early age and at full maturity. A complete description of the process, the equipment required, and its surface finishing considerations for both situ and pre-cast uses is described in "Rubber Developments," a free publication of the **Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C.**

CUTS PAPER WORK—"Methods and Procedures for Efficient Figurework" outlines a number of contractors' case histories showing how they cut down on clerical work with Remington Rand's model 99 printing calculator. Subjects covered in the manual include checking incoming invoices, preparing estimates, computing labor cost, computing payrolls and data for compensation insurance payments, and other front office jobs. A specific application describes how to compute concrete cost when preparing estimates.—**Remington Rand Div., Sperry Rand Corp., 315 4th Ave., New York 10, N. Y.**

35-TON CRANE—The Thew Shovel Co. has published a two-color, 16-p catalog describing the model MC-530 Lorain Moto-Crane, a 35-ton unit recently added to the Lorain line. The booklet discusses the crane's "shear-ball" mounting, 35-ft pin-connected boom, remova-

HOW TO HANDLE
WET JOBS

#35 of a Series

WELLPOINTS ELIMINATE SHEETING

Harbison-Walker Brick Refractory, Hammond, Ind. — *Contractor:* Consolidated Engineering & Construction Co.

WHEN A JOB-SITE is located, like this one, in the middle of a swamp —and when the water-bearing soil is a fine sand with an underlying layer of clay — it's not surprising that the contractor should figure on sheeting. Such expense, of course, runs heavy.

• Actually, in this case—as in many others which "look like" sheeting jobs—Griffin engineers were able to solve the problem far more quickly and economically with the use of wellpoints alone. Photo shows 2-stage system which successfully drained the 27 ft of ground water as required.

• Whatever your pre-drainage problems—power plants, pipelines, buildings, etc.—if you want lower costs for lowering water, it will pay you to check with Griffin, wellpoint specialists for over 2 decades.

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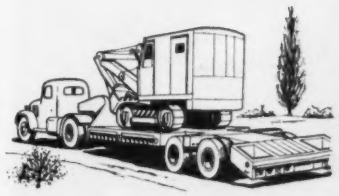
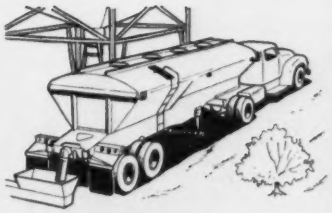
highway construction need



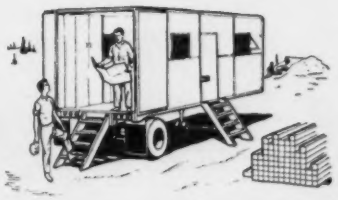
TRAILMOBILE LOW BEDS

. . . are used to deliver heavy road building equipment to the job area. Steel shovels, bull dozers and other large tractor-treaded units can be easily transported on these powerfully built trailers.



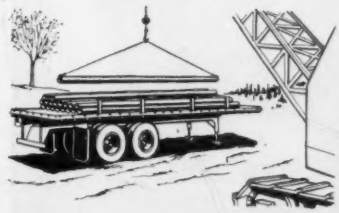
TRAILMOBILE CEMENT BULKERS

. . . transport large amounts of bulk cement to mixing plants at the job site. Both steel and aluminum types offer exclusive step-down design with twin screw discharge.



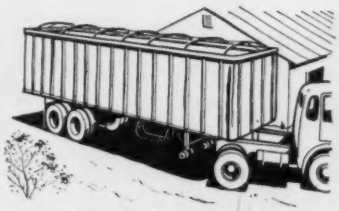
TRAILMOBILE FREIGHT VANS

. . . combine weather protection and mobility for hauling general supplies. Low cost used vans provide ideal job site offices, tool shops or storage facilities.



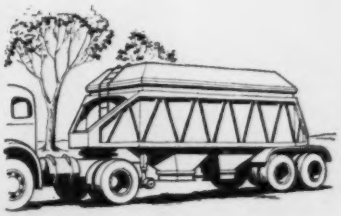
TRAILMOBILE PLATFORM TRAILERS

. . . are used for carrying lumber, cement forms, drainage tile, straw bales and sundry light equipment. "Sideless feature" permits simpler, faster loading and unloading.



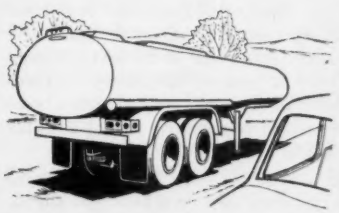
TRAILMOBILE OPEN TOPS

. . . are extensively used for carrying tools and construction materials. These units can be equipped with tarpaulin roof covers to protect contents against sun, rain or snow.



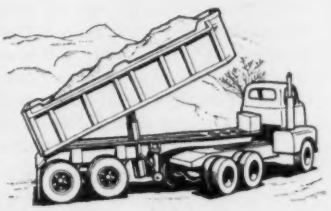
TRAILMOBILE HOPPER TRAILERS

. . . are used for carrying and spreading aggregate, gravel and sand. Bottom discharge permits uniform spreading of contents over a wide area.



TRAILMOBILE TANK TRAILERS

. . . are widely used for hauling hot asphalt, road oils, and the great volume of water required at the site. Most units carry a unique guarantee against tank leakage.



TRAILMOBILE HYDRAULIC DUMPS

. . . provide big capacity in a dump-type trailer for hauling and unloading sand and gravel. Unusually rugged construction guards against costly out-of-service time.

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Please send me further information on the trailer types I have indicated below:

- ☐ Low Beds
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- ☐ Cement Bulkers
- ☐ Tank Trailers
- ☐ Freight Vans
- ☐ Hydraulic Dumps
- ☐ Open Tops
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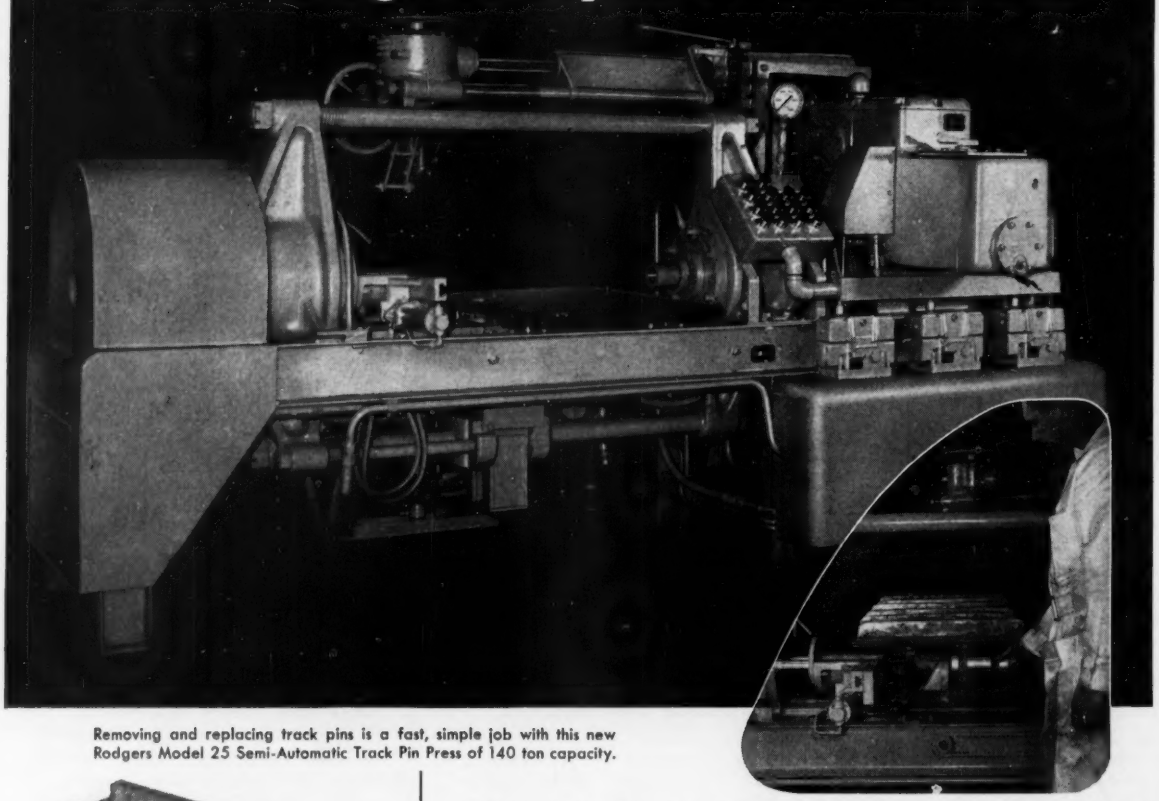
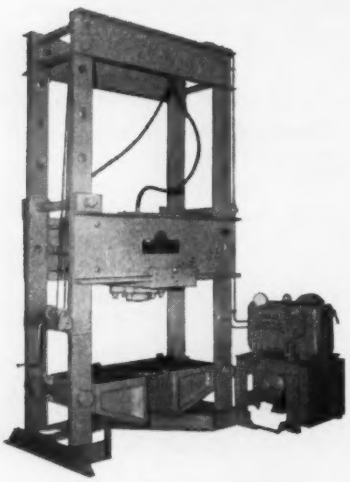
SAVE MAINTENANCE COSTS
with Rodgers Hydraulic Presses



Removing and replacing track pins is a fast, simple job with this new Rodgers Model 25 Semi-Automatic Track Pin Press of 140 ton capacity.



A Rodgers Shop Press such as this 200 Ton Open Yoke will keep your shop running smoothly and efficiently for both production and maintenance work. Offered in capacities from 60 to 400 tons for pressing, bending, straightening, forming and assembly jobs.

Reduce costly downtime of productive crawler tractors—service tracks faster, cheaper and safer with a Rodgers Hydraulic Track Pin Press. A pioneer in this type of equipment, Rodgers Hydraulic has over 25 years of experience in manufacturing manual and power operated presses for track repair and maintenance. Available in both stationary and portable models, there are Rodgers presses to suit every requirement. The new semi-automatic Model 25 Track Press shown above is one of many new Rodgers presses whose use results in big savings to equipment owners and more profits to repair shops.

PORTABLE UNIVERSAL SERVICE JACK—This Rodgers unit is used for pulling and replacing sprockets, gears, pinions, idler brackets and shafts. A valuable tool for any shop, the portability feature makes this jack especially handy for emergency track pin and bushing repairs in the field.

RODGERS JACKING UNITS—To push reinforced concrete pipe and metal culverts underground without digging ditches, there are Rodgers Hydraulic Jacks in capacities ranging from 50 to 400 tons. Other versatile applications such as raising bridges and heavy structures effect big savings in time and expense over slower, conventional methods.

RODGERS SHOP PRESSES—To perform the tough jobs in your shop there is a large selection of Rodgers Shop Presses in various styles with capacities from 60 to 400 tons. The 200 ton Open Yoke Shop Press illustrated at the left is characteristic of the rugged construction of all Rodgers products.

Write for literature on Rodgers Track Presses, Shop Presses and other maintenance equipment.

See Rodgers Exhibit at CHICAGO ROAD SHOW
January 28-February 2
BOOTH 368

HI-PRESSURE Rodgers HYDRAULICS

Rodgers Hydraulic Inc.

7403 Walker Street, Minneapolis 16, Minn.

NEW PUBLICATIONS . . .
Continued

ble counterweight, front and rear outrigger boxes and beams, and the optional "metered-air" controls. The carrier is available with 6 x 6, 6 x 4, and 8 x 4 axle arrangements. **—Thew Shovel Co., Lorain, Ohio.**

USF PRODUCTS—United Steel Fabricators, Inc., has released a new bulletin on the company's complete line of products for the heavy construction industry. These include USF guard rail, bridge flooring, steel forms for bridge decking, and corrugated metal pipe. Data on USF steel buildings is included also.**—United Steel Fabricators, Inc., Wooster, Ohio.**

DIAMOND BLADE JARGON—The Clipper Manufacturing Co. offers users of masonry and concrete cutting diamond blades a newly published pamphlet that explains the terms used in the industry. Such terms as black diamonds, secondary abrasives, metal bonds, grit sizes and diamond concentration are explained. Write for pamphlet 1013.**—Clipper Mfg. Co., 2800 Warwick, Kansas City 8, Mo.**

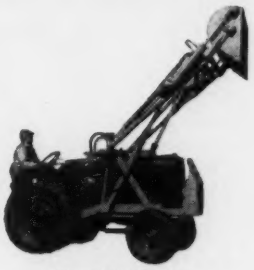
CASE HISTORIES—Four new Tractair case histories have been issued by Le Roi. These cover the use of the Tractair portable compressor on building, highway, mining, and plumbing jobs.**—LeRoi Div., Westinghouse Air Brake Co., Milwaukee 1, Wis.**

SEWER WORK—A 4-p. illustrated bulletin entitled "Good Practice in Sewer Construction" has been published by the Clay Sewer Pipe Assn. Complete data on proper techniques for finishing, back-filling, inspection and trench preparation is included. Copies are available from the association's member manufacturers or **Clay Sewer Pipe Assn., 311 High-Long Building, 5 E. Long St., Columbus 15, Ohio.**

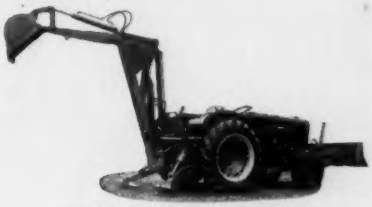
I-H TRUCKS—International Harvester has now entered the off-highway truck field with two new Payhaulers. A 6-p., two-color fold er describes the 24-ton model 95 and the 18-ton model 65. Close-up photographs and drawings illustrate principal components of the units, which feature exceptionally high top speeds, turbocharged diesels, and rugged bodies.**—Construction Equipment Div., International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.**

MARVEL SYNCLINAL FILTERS
Are Standard Equipment

Illustrated below are a few but a representative group of the various types of heavy Road Building and Construction equipment on which the manufacturers install MARVEL SYNCLINAL FILTERS as standard equipment.



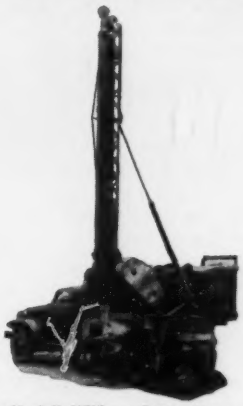
Ottawa Steel Products, Ottawa, Kans.



Pippin Construction Equipment Corp. White River Junction, Vt.

Euclid Road Machinery Co., Cleveland, Ohio

Unit Crane & Shovel Corp., Milwaukee, Wis.



Hugh B. Williams, Dallas, Texas

Dart Truck Co., Kansas City, Mo.

Sump Type (Cutaway)

MARVEL SYNCLINAL FILTERS are designed for efficient filtration of hydraulic oils and to provide dependable protection to the inner mechanisms in all hydraulic and other low pressure circulating systems. They meet J.I.C. Standards.

EASY TO CLEAN

Sturdily constructed to give long and trouble-free service—yet are easily disassembled, thoroughly cleaned and reassembled in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connections.

A SIZE FOR EVERY NEED

Available for either sump or line installation in capacities from 5 to 100 G.P.M. Choice of Monel mesh sizes range from coarse 30 to fine 200.

IMMEDIATE DELIVERY

All sizes and models listed in catalogs are stock items and shipment can be made immediately upon receipt of your order.

Line Type (Cutaway)

MARVEL ENGINEERING COMPANY

7227 N. Hamlin Ave., Chicago 45, Ill., Phone: JUniper 8-6023

Catalogs containing complete data available on request

Catalog No. 107 for Hydraulic Oils, Coolants, Lubricants
Catalog No. 301 for Water
Catalog No. 200 for Fire-resistant hydraulic fluids (Aqueous Base)
Catalog No. 400 for Fire-resistant hydraulic fluids (Synthetic)

CME-1

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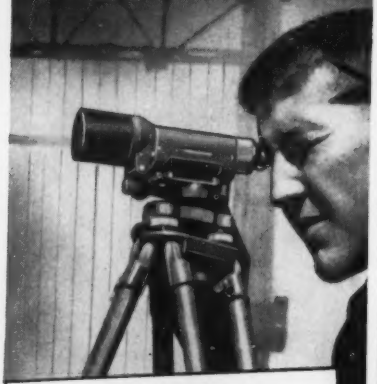
City..... State.....

WHERE THERE'S A
BIG JOB
THERE IS A
KERN
INSTRUMENT



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precision surveying instruments... compact, rugged construction... fast, effortless operation. More reliable results in less time.

KERN'S NK3
precise level

in use at Gloucester Anchorage of new Walt Whitman Bridge being constructed over Delaware River. (Modjeski & Masters, Consulting Engineers)

DESIGNED FOR
HIGHEST
PRECISION LEVELING

- Functional, down-to-fundamentals design—only 4½ lbs. (8 lbs. with carrying case).
- Coincidence level and fine tilt screw.
- Readings at a glance—level and rod may be read simultaneously through 30x Telescope.
- Mean leveling accuracy under normal conditions ± .008 ft. per mile.
- Kern AR coated optics produce substantial increase in brilliance and contrast of image.

Write for Brochure NK 527-3

PROMPT, RELIABLE SERVICE
FACTORY TRAINED PERSONNEL

Kern and Only Kern Offers You the Latest Designs of Dr. Henry Wild

Kern SWISS *The FINEST in SURVEYING EQUIPMENT*

KERN INSTRUMENTS INC.
120 Grand St., White Plains, N. Y.

SOME BIG CONTRACT AWARDS OF THE MONTH

The Arthur A. Johnson Corp. & Peter Kiewit Sons Co., 347 Madison Ave., New York 17, N.Y. A concrete substructure work on State Thruway's mile-long $20 million bridge across Hudson River, approximately 1½ miles south of Selkirk and Castleton in Albany and Rensselaer Counties for Department of Public Works, The Alfred E. Smith State Office Building, Albany, N.Y. $5,767,495.

C. J. Langenfelder & Son, Inc., 8427 Pulaski Highway, Baltimore, Md. Runway improvements at Olmsted Air Force Base, Middletown, Pa. for the U.S. Eng., 24 St. and Maryland Ave., Baltimore 3, Md. $12,544,177.

Villa Contg. Co., Inc., 233 North Avenue, Westfield, N.J. Grading, drainage, paving and structures from point 1,800 ft north of Rte. 10 to point 3,900 ft north of Rte. 656, Chesterfield Co. The Richmond-Petersburg Turnpike Authority, 1015 E. Main St., Richmond, Zone 2. $2,447,634.

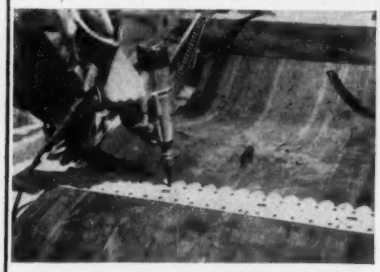
Charles L. Harney, Inc., 575 Battery St., San Francisco, Calif. Portions of elevated Embarcadero Freeway in San Francisco, two-level structure to provide for minimum of four-traffic lanes at each level, San Francisco Co. State Division of Highways, 1120 N St., Sacramento, Calif. $7,075,009.

General Electric Co., 1 River Road, Schenectady, N.Y. Turbine generator for 450,000-kw electric power generating unit at Philip Spron Plant, Graham Station, W. Va. Appalachian Electric Power Co. and Ohio Power Co., 301 Cleveland Ave. S.W., Canton, Ohio. A. G. E. Service Corp., 30 Church St., New York 8, N.Y. engrs; **Babcock & Wilcox Co.**, 161 E. 42 St., New York 17, N.Y. Twenty-three-story boiler. (Graham Station, W. Va.) $58,000,000.

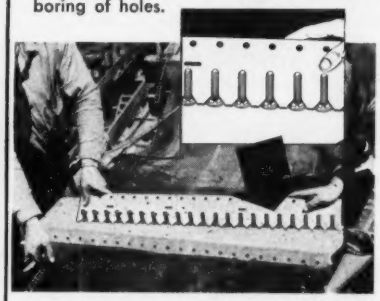
Myers Brothers Constr. Co., 3407 San Fernando Rd., Los Angeles, Calif. and H. C. Smith Constr. Co., 2900 Rowena Ave., Los Angeles, Calif. General contr. vitr. clay sewer pipe plant at Corona, Calif. for Gladding McBean & Co., 290 Los Feliz St., Los Angeles, Calif. $5,000,000.

NEW
FLEXCO
POWER TOOLS
CUT APPLICATION TIME IN HALF

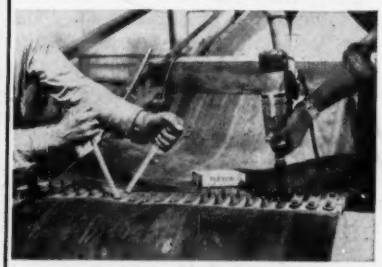
Your two man belt team can now join a belt 30" wide in 15 to 20 minutes . . . using the new FLEXCO Power Tools.



The FLEXCO Power Tool Boring Bit used with electric or air impact tool speeds boring of holes.



New FLEXCO Templet positions bolts for quick joining of belts. Reaching under belt has been eliminated.



Running down nuts is fast with the new FLEXCO Power Wrench used with electric or air impact tool. Two Bolt Breakers are used together to complete the joint.

If you are interested in speeding up fastener application, order the new Power Tools from your local FLEXCO Distributor. Write for Bulletin F-112-A.

FLEXIBLE STEEL LACING CO.
4699 Lexington Street • Chicago 44, Illinois

No hydraulics to break, leak or freeze-up!
No small front steer-wheels to align!
No tie-rods to bend!
No springs to break!
No frame to warp!
No long drive-shaft to maintain!

Cuts your hauling costs!

Tournapull Rear-Dump overcomes most maintenance problems of conventional haulers

Construction of Tournapull Rear-Dump is radically different (and much simpler) than that of a conventional heavy-duty hauler. In place of a foundation frame and body sub-frame, Tournapull Rear-Dump hitches rear and front wheels through a horizontal yoke extending back from the kingpin, and pivoted to body itself just above and ahead of rear wheels. Body is simpler, much stronger... has no frame and sub-frame to get out of line.

Look at the photo above . . . note the absence of springs, spring hangers, and tie-rods. Low-pressure tires adequately absorb the shocks of rough haul-road travel and shovel loading. Eliminated are spring maintenance, replacement time, and cost of spring parts.

Front-wheel drive and kingpin-type power steer helps simplify Tournapull construction, too. No longer must power be carried back to the rear through a drive-shaft. Bearing and lubricating problems of a long drive-shaft are eliminated. No longer is steering handled by small front wheels subject to "bulldozing" and misalignment. There are no tie rods, no hinged steering connections to become twisted or bent.

Nor do you have the troubles of hydraulic hoists or gravity dumping with these Rear-Dumps. Dump is by an electric winch, that lifts the body up on twin cables. Operation is under complete control at all times — with positive power for dump and return controlled by an electric switch on the dash. There are no oil seals, hydraulic pumps... no high-pressure lines and jacks to keep tight... no freezing up in cold weather as with hydraulics. There are no shock loads as in gravity dumping. You save on regular maintenance time because there is no hoist mechanism to check... only a few places to inspect and lubricate.

Let us show you how these savings can put money in *your* pocket. For proof, we'll be glad to show you performance figures from a job like yours. Or, if you wish, we'll give you names and addresses of nearby owners of Tournapull Rear-Dumps, so you can check the facts for yourself.

Model D — 11 tons, 138 hp

Model C — 22 tons, 208 hp

Model B — 35 tons, 293 hp

Now available with optional tailgate. Prime-mover also powers interchangeable scraper, bottom-dump, flat-bed, crane, logging arch.

Tournapull—Trademark Reg. U.S. Pat. Off. R-1171-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

Now-GMC's new tandem

—with more power—more "muscles"—more earning capacity—for every construction use

Now the wraps are off these great new GMC super-trucks—destined to hike the profits of haulers in every kind of construction work.

There's new, cost-shrinking power right down the line. A 220-h.p. Six delivering tremendous torque. Two new short-stroke V8's at 206 h.p. and 232 h.p.

There's a sensational new Turbo-power Diesel. Its 2-cycle design gains most from turbo-charging—taking as much as 11 horsepower right out of the air—from otherwise wasted exhaust flow!

And that's not all. New axle and spring options* equip these haulers to handle bigger jobs.

There are bigger, surer brakes, too. In fact, these GMC's are engineered—from rims to roof—to snap through bigger, tougher jobs—with less time out for repairs. So there are far lower maintenance costs—far lower operating expense in every department.

And many models now offer a front engine PTO drive option*—eliminating all need for an auxiliary engine for transit-mix work.

Add it all up and it's easy to see why these great new GMC tandems are called Money-Makers. They blanket the 28,000 GVW-90,000 GCW range. And your GMC dealer has the story on every one of them!

**Optional at extra cost*

GMC TRUCK & COACH—*A General Motors Division*

New turbo-charged six-cylinder 2-cycle Diesel that delivers more power on less fuel.

New high economy V8's with 206 and 232 h.p. A new 220-h.p. Six delivering tremendous torque.

m Money-Makers for '57

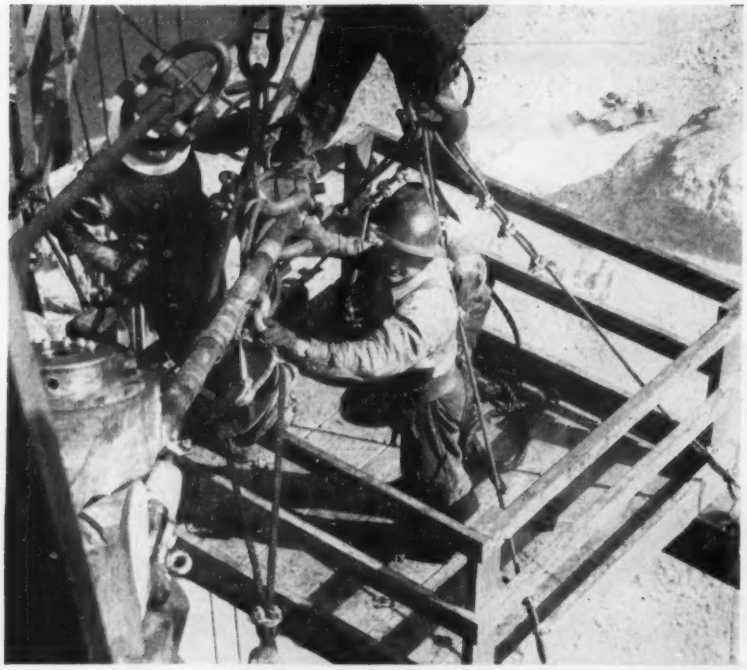
New Hydraulic fans on Diesel models that operate only when needed – and save up to 10 h.p. and 5% on fuel.

New full-length frame reinforcements – for liquid loads and other severe service – are a new option that gives these GMC's tremendous stamina.

New axle and spring options that permit bigger payload values.

New optional front engine Power Take-off to handle transit mixers without auxiliary power.

206
. Six



WORKERS RELY ON CROSBY CLIPS

Rigging a cable way 600 feet in the air demands the best fittings available to protect men and materials. This crew is assured of maximum safety because their work platform is secured with genuine Crosby* Clips. This clip, quickly identified by the "Red U-Bolt*" is the number one choice on every job where maximum safety and holding power is essential. Look for the red U-bolt—you'll see it securing wire rope in every industry! And Crosby is the *only clip* available in sizes to fit every rope from ⅛" to 3"! Proved design and quality controlled manufacture—finest steel, drop forged base, galvanized—results in consistently reliable performance.

THIMBLES INCREASE ROPE LIFE, SAFETY

Unless protected by a thimble, wire rope can be seriously damaged by heavy lifts that crush the strands at the load point. A light thimble can collapse and damage the rope. For positive rope protection and safety, specify Crosby Laughlin heavy plow steel thimbles with the extra heavy steel section design that stands up under maximum loads. Plow Steel Thimbles are available in sizes to fit ¼" to 2¼" wire rope. Stainless Steel Thimbles are offered in selected sizes.

From one source, Crosby Laughlin Lebus, you get the world's most complete line of fittings: Crosby Clips and "Load Rated" Blocks; Crosby-Laughlin drop forged shackles, hooks, Missing Links*, turnbuckles, thimbles, and other fittings; famous drop forged Lebus Loadbinders and drop forged Snatchblocks! Your Crosby Laughlin Lebus Distributor is your one stop fittings supplier—see him next time you need *any* fittings!

*REGISTERED TRADEMARK

World's Most Complete Line of Fittings For Wire Rope and Chain

CROSBY LAUGHLIN LEBUS

FORT WAYNE 1, INDIANA

WONDER TOOLS . . .

continued from page 89

In the first place, the accuracy of electronic computing will command widening respect among engineers and contractors. Greater appreciation of the capabilities of refined photogrammetric methods will add confidence in the fairness of planned-quantity payments. And, of course, no one will ignore the faster pay angle.

Subsurface Investigation

The production of better advance data is not confined to the ground surface as revealed by aerial photographs and supplemented by computers. Science also has brought seismic subsurface investigation and soil-resistivity measurements to put mileage on the traditional—and still indispensable—core borings. Contractors and state engineers who have had their fingers burned by misleading boring data and who have shied away from classified earth quantities may yet return to them because of the broader, more comprehensive information now available.

Depth of overburden and continuous bedrock profiles are being obtained economically by seismic methods for many highway projects today. At least one state, New York, has had its own crews in the field for three years.

Developed many years ago for deep investigations of potential oil-bearing formations, the seismic method only recently has been refined to measure the fast shock-waves of shallow-depth work.

The two principal items of equipment are a 12-channel seismograph, with its attached seismic-record developer, and a two-stage amplifier for adjusting signal strength. Signals are received from 12 geophones strung out evenly along a transmission wire of suitable length (normally 110 ft to 550 ft). The geophones are fist-sized. Each contains a coil surrounding a spring-mounted permanent magnet. Any motion of the magnet from ground vibration is transmitted to the seismograph.

When the spread is ready, a small charge of dynamite is exploded at one end of the geophone string. Shock waves travel down to bedrock and back up to the geophones, arriving at successive instants to be recorded on the seismograph. Simple computations made from the seismograph's record give bedrock depth under the spread.

Continued on page 347

IMPOSSIBLE WITHOUT EXPLOSIVES

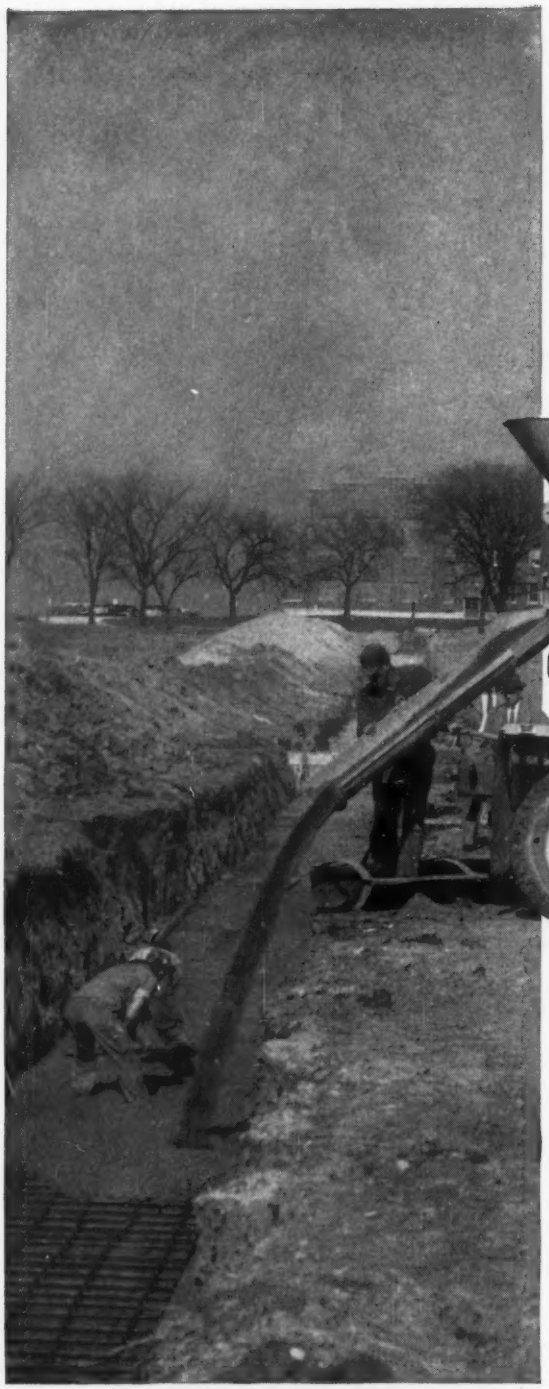
The modern highway—wide and spacious with increased visibility and no cross traffic—is a tribute to modern construction techniques. The above section of U.S. 99 between Bakersfield and Los Angeles, California, is a good example of engineering know-how. Where rock was encountered, blasting crews with Hercules explosives took over.

For more than forty years, Hercules has engaged in continuous research into the development of explosives materials and improved blasting techniques. Whether your requirements are for construction, mining, quarrying, seismic prospecting, or in other fields where explosives are needed, Hercules technical representatives will be glad to assist in the selection of the right materials for the most efficient job.

HERCULES POWDER COMPANY
INCORPORATED
Explosives Department, 974 Market St., Wilmington 99, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Calif.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Calif.

XR56-2



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heat treating doubles Rex Blade life

It isn't likely that you ever have needed to replace the drum blades on your Rex Moto-Mixer... but just on the chance that you're operating in a territory where the aggregate is unusually abrasive, Rex Blades are now heat treated—assuring you greatly increased life under severe service.

This hidden feature is exclusive with Rex. It's another plus value in Rex leadership engineering.

Rex Adjusta-Wate Moto-Mixers® are available in all standard sizes—with auxiliary drum power or with FEPTO, the new Front Engine Power Take-Off that rotates your drum at speeds unaffected by declutching and gear shifting. See your Rex Distributor or write CHAIN Belt Company, 4664 West Greenfield Avenue, Milwaukee 1, Wisconsin.

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WONDER TOOLS . . .

continued from page 344

Chiefly a designer's tool to date, seismic subsurface investigation also helps contractors. For instance, one road contractor was dissatisfied with available subsurface data on part of a New York State superhighway he expected to bid. He engaged a private seismic service to investigate. Five days later the seismic expert advised him that the job was 40% rock. This placed the contractor's earthwork figure substantially above the owner's estimate, and the contractor refrained from bidding. Subsequent field observation of the low bidder's excavation confirmed the seismic rock estimate.

Resistivity is another geophysical technique that has been used by engineers and contractors alike to probe the earth's insides. Particularly well adapted to outlining granular material deposits, it is a friend in need for the contractor who works in gravel-shy areas.

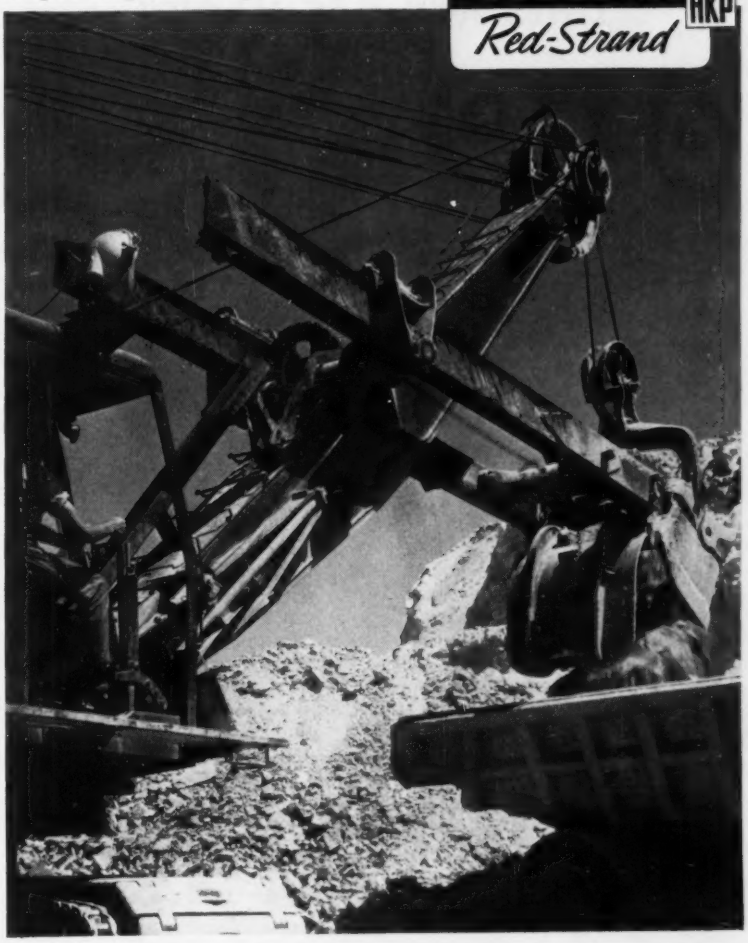
Equipment requirements are even simpler than those for seismic work. Four electrodes—long metal stakes—are driven in a square pattern of variable size. They are hooked up to a battery and a resistometer, and that's all. Observations consist of recording ground resistivity as read on the meter. Simple calculation and comparison of the results with resistivity standards for various soils reveal the nature of the earth being tested. Moreover, the technique can be adapted to bed-rock-depth determination and to the clarification of occasional inconclusive seismic data.

Another aid in the contractor's and engineer's search for better advance knowledge of subsurface condition is photo-interpretation. It is particularly useful in recognizing the telltale feature of glaciated terrain — which frequently means hidden gravel deposits.

Locating and designing engineers make effective use of photo-interpretation, frequently solving subsurface problems quickly before a preliminary survey party sets foot on the ground. Weeks and even months of engineering lead time frequently are saved by this photographic analysis of land forms.

By observing stereoscopically the inter-relationship of the relief, soil, rock, and ground water characteristics, the photo-interpreter builds up his analysis. He combines these observations with available soil

Improving wire rope service with LESCHEN HKP *Red-Strand*

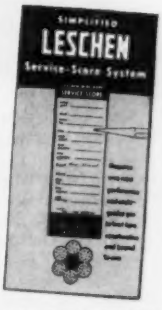


How to prove wire rope performance for yourself

There is a difference in wire rope—in types, in constructions, in brands. And using the right rope every time can easily reduce rope costs by 10% to 20% or more.

How do you know which rope is right? First, get good advice. Leschen field men, distributors and Leschen's engineering department can help you make the best choice. Second, prove it out with easy-to-use Leschen Service-Score stickers. They tell you right on the job how you're doing—help you make accurate comparisons.

Keep the score—see the results—and you'll use more Red-Strand Wire Rope. See your Leschen man or write Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Missouri.



Leschen engineering advice and Service-Score Stickers are yours for the asking. Write for fact-folder.

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H. K. PORTER COMPANY, INC.

"BEST DITCHER FOR IRRIGATION LINES AND GAS MAINS"

"My 4T Pow-R-Ditcher is the best machine I've ever used for irrigation lines and gas mains for the Kansas Power & Light Co. It's the finest small ditcher on the market for all-around performance and low cost ditching."

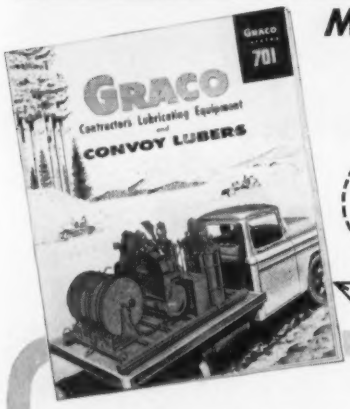
D. Catherman
SALINA CRANE & SHOVEL CO.
Salina, Kansas

VERMEER MIDGET DITCHER DIGS MORE . . . COSTS LESS

Here's just the machine for laying gas pipe, service lines and digging foundation footings. One man operation. Very maneuverable for those "tight spots." Only 48" wide, 6' high, 13' long. Digs 6" to 14" wide and can be transported in a pickup truck. Thousands in use. Write for complete information.

Some Excellent Distributor Territory Available

VERMEER MFG. CO., Pella, Iowa



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THIS FREE BOOK TELLS YOU HOW TO DO IT!

DESIGN YOUR OWN LUBE SERVICE TRUCK, fully equipped with the grease, oil and air components you need! Get complete information from Graco's new Convoy Luber book — 25 big pages that tell you how to do it the best and quickest way.

See how to "job-plan" your convoy luber in six easy steps . . . get valuable charts, diagrams and specifications . . . learn about the latest Graco pumps, hose reels, and other equipment that will make your lube truck the best on the road.

SEND FOR YOUR COPY of Graco's Convoy Luber handbook today — it's a valuable free guide you'll want to read from cover to cover!

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WONDER TOOLS . . .
continued

and geologic maps of the area to predict the following:

(a) Sources of selected borrow, granular base-course material, and local aggregates.
(b) Areas subject to landslides, settlement under applied loads, or frost.
(c) Identification of bedrock to indicate excavation requirements.

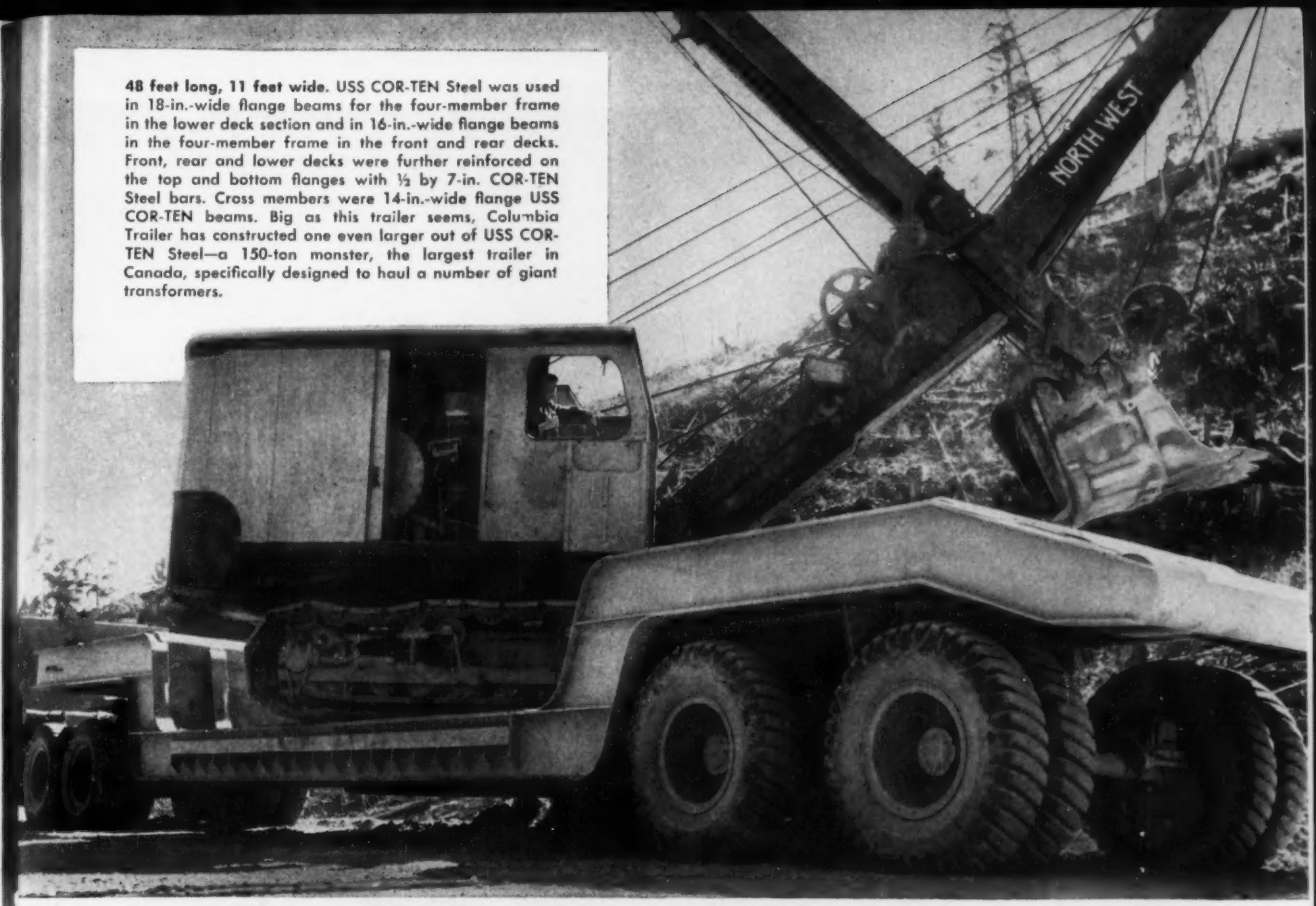
Thus with the aid of the right photograph—and skilled photo-interpretation—the highway contractor in many cases can save weeks of field inspection of the ground. Moreover, any reasonable amount of ground examination might fail to reveal the "most economical" data that photo-interpretation readily brings in.

Photogrammetry places a previously unobtainable breadth of terrain data before the highway engineer. Instead of having one or a few preliminary lines from ground surveys, the engineer can have a mile-wide band of topography at 1" = 200', 5-ft contours. Designs, too, are based on quickly obtained photogrammetric maps, generally at 1" = 50', with 2-ft contours. Numerous trial lines can be run through the electronic computer, yielding the best of several lines rather than the best of two of three—the most that could be computed economically by hand methods.

Seismic subsurface investigation provides in-between data to supplement borings; they are obtained independently of borings so there is no time loss in this broadening of preliminary engineering data.

Construction lead-time — from inception to award of contract — can be reduced from a minimum of 18 months by traditional methods to 12 to 13 months by currently accepted application of the "wonder tools." This means jobs get to the contractors sooner, frequently a full construction year sooner.

The foregoing speed-up still doesn't solve the problem of embarrassingly coincident bid dates. However, last November IBM reported that the Texas State Highway Dept. had programmed its contract-letting problem. In this state, the size of a whole region in other U.S. areas, it may be possible to develop coordination experience that will be readily adaptable to groups of states where contractors work on a regional basis.



48 feet long, 11 feet wide. USS COR-TEN Steel was used in 18-in.-wide flange beams for the four-member frame in the lower deck section and in 16-in.-wide flange beams in the four-member frame in the front and rear decks. Front, rear and lower decks were further reinforced on the top and bottom flanges with ½ by 7-in. COR-TEN Steel bars. Cross members were 14-in.-wide flange USS COR-TEN beams. Big as this trailer seems, Columbia Trailer has constructed one even larger out of USS COR-TEN Steel—a 150-ton monster, the largest trailer in Canada, specifically designed to haul a number of giant transformers.

"The use of USS COR-TEN Steel in 100-ton trailer increases strength, reduces weight about 20%,"

says **Mr. A. Kenneth Cutler,** *Purchasing Agent, Columbia Trailer Company, Vancouver, B. C.*

In this big trailer, designed by the Columbia Trailer Company for Columbia Cellulose Company, strength was the prime consideration. It had to be strong enough to haul off highway a two-yard, 90-ton Lima Shovel and other pieces of logging equipment such as large skid-mounted yarders and loaders. The trailer also had to be as maneuverable and light in weight as practical.

"We always use USS COR-TEN Steel in designing trailers of this type," explains Mr. Cutler. "And 90% of this trailer is COR-TEN Steel. When a trailer is made from carbon steel there is a greater possibility that it can be permanently damaged from overloading than in the case of a similar unit made from high strength steel. USS COR-TEN also gives excellent corrosion resistance and freedom from excess weight. This finished trailer weighs 43,990 pounds—about a 20% saving over carbon steel construction."

Mr. R. Cedric Telford, Manager, Columbia Cellulose Company, Terrace, B. C., is delighted with the performance of his trailer. "The drivers have all expressed their satisfaction with the trailer. It is easy to handle and maneuver in spite of its great length. Its lighter weight, of course, will mean less cost in hauling the unit, and its increased capacity—over the 50-ton units we formerly operated—will enable us to move our heavy logging and construction equipment more safely and quickly so as not to interrupt our production schedules."

USS COR-TEN High Strength Steel has a yield point 1½ times that of regular carbon steel, has 4 to 6 times the resistance to atmospheric corrosion, has 50% greater fatigue strength and offers superior resistance to abrasion and impact. COR-TEN Steel has long been in wide use by truck or trailer manufacturers to give their equipment greater capacity through lighter weight, greater strength or longer life.

For more data, write for a free COR-TEN booklet or contact a United States Steel Sales Office.

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USS

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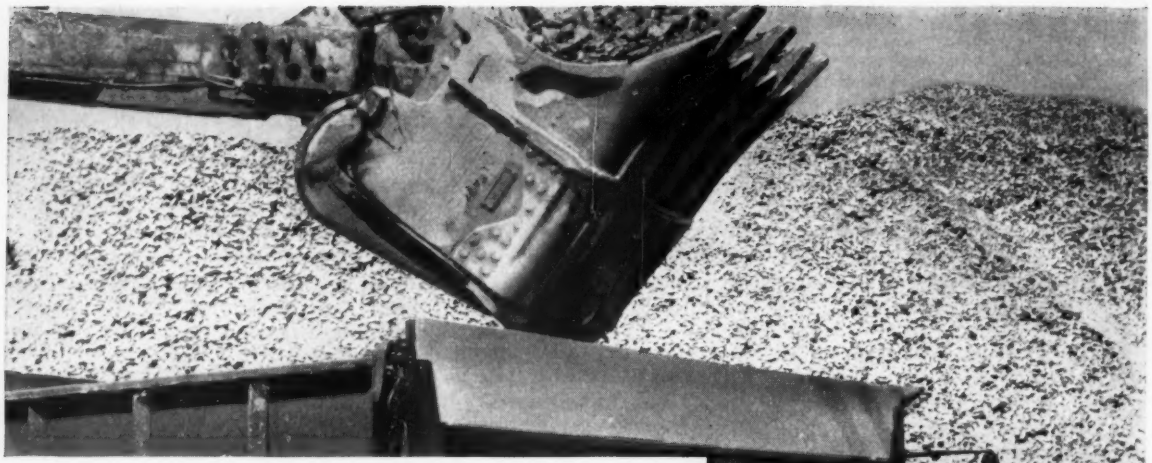
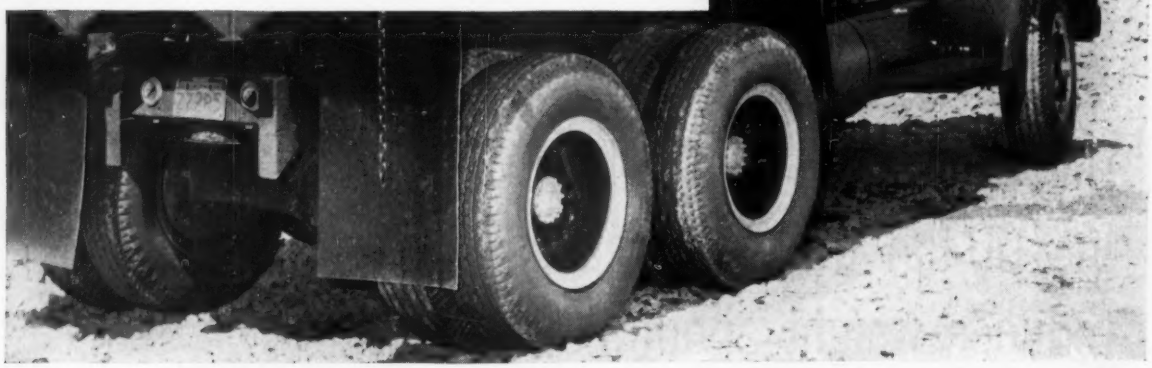


"We're sold on NYLON CORD TIRES"

—says N. W. Narehood

Vice President, Narehood Bros., Inc., Milton, Pa.



"We get longer wear, more retreads, fewer failures with nylon cord tires"

"Our road delays due to tire failures are down 90%. We used to have plenty of blowouts, particularly in hot weather. Now they're a rare thing!

"Six days a week, 12 hours a day, we move our 20-truck fleet over a 150-mile radius from the quarry to road-construction sites. The trucks roll over piles of blasted rock with 16-ton loads, yet some of our nylon cord tires have seen over 125,000 miles' service. We've found nylon cord tires have the extra strength to take day-in, day-out punishment and still give us good service after three retreads. You can see why our tire costs are down and why we've authorized total replacement with nylon cord tires for our fleet!"

PROVE TO YOURSELF that nylon cord truck tires give more mileage, more retreads, at the lowest cost per mile. Ask your dealer about nylon cord truck tires today. (Du Pont makes the tough nylon yarns, does not produce tires.)

DU PONT NYLON FOR TIRE CORD

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT
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FOR TRUCKS AND PASSENGER CARS, TOO . . .
THE STRONGEST, SAFEST TIRES ARE MADE WITH NYLON CORD

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MAYFIELD, Wash.—Workmen, held by safety ropes, drill away on a cloudy stone cliff high above roiling Cowlitz River to prepare abutment for Tacoma City Light's $37,000,000 Mayfield Dam being built to bring needed electrical energy to the northwest Washington area.

NO MATTER WHERE YOU GO—
If You See Hose, You'll See
PUNCH-LOK HOSE CLAMPS

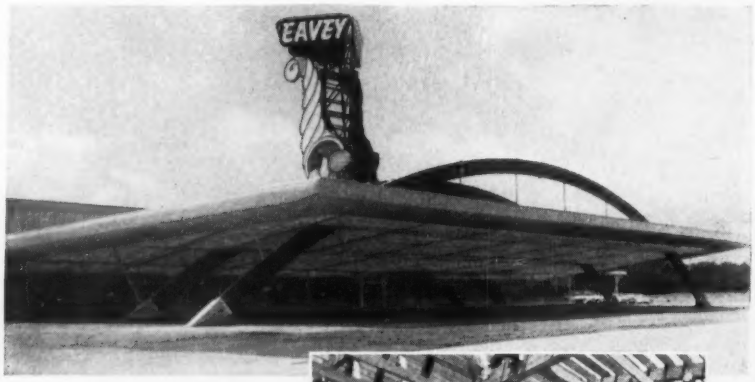
Write for Descriptive Literature or
See Your Nearby PUNCH-LOK Distributor

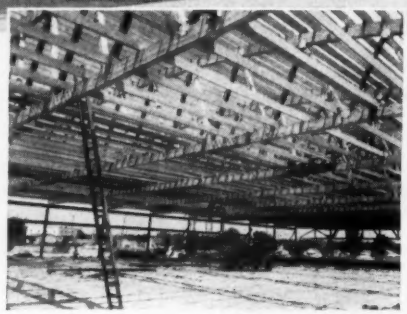
"The Sign of a GOOD Hose Clamp"

PUNCH-LOK Company

6437 Dept. E, 321 North Justine Street, Chicago 7, Illinois

Supermarket spans years of construction progress . . . USES *Ramset*®!





Ramset System saves $10,000 and two months' time for new Ft. Wayne Supermarket

Using the latest construction methods, contractors completed Eavey's Supermarket in Fort Wayne, Indiana, ahead of schedule and ahead of budget!

The electrical contractor reported hanging 10,000 feet of conduit carrying 350,000 feet of wire, with RAMSET, using 100,000 fasteners for the job. About $10,000 and two full months were saved by using speedy RAMSET SYSTEM, according to George Clement, service engineer for Eavey's. Other contractors saved in the same way.

RAMSET FASTENING SYSTEM can be used in a variety of ways on most jobs: electrical, plumbing, air conditioning, door, window and wall installations. Moreover, RAMSET is just as valuable in the plant maintenance operation as to the original builders and contractors.

You can anchor almost anything to concrete and steel with RAMSET. New catalog is ready, send for your copy now.

companion tool

Shure-Set
TRADEMARK

Baby brother to RAMSET, this hammer-in tool uses no cartridge, but makes your own hammer power more effective. For masonry, mortar joints, cinder block. Ask for literature.

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION
12103-A BEREA ROAD • CLEVELAND 11, OHIO

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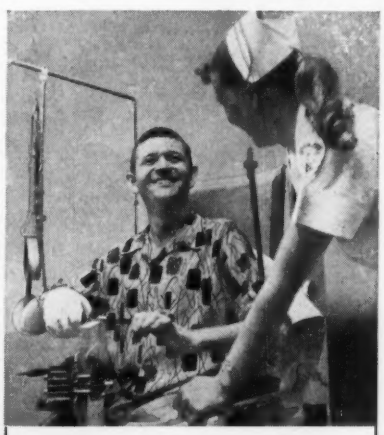


"Look, I can use my hands again"!

Let's Finish the Job!

JOIN THE MARCH OF DIMES

LOOK TO WILLSON
for another new development in head protection!

NOW—SUPER-TOUGH
PHENOLIC
SAFETY HATS AND CAPS

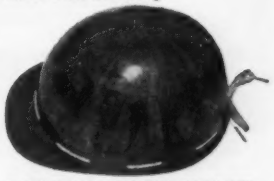
FROM THE WILLSON RESEARCH CENTER now comes the "Phenolic" line of scientifically designed safety headgear that meets all specifications with ease!

In this Super-Tough line are safety developments so outstanding that you'll find it offers unequalled value. For instance, the famed "geodetic suspension" and the unique pneumatic headband are obtainable in both adjustable *lace-in* and *snap-in* types of hats and caps.

Ask your Willson distributor to demonstrate the heavy duty Phenolic line that combines comfort and maximum head protection. Or write for latest "Super-Tough" bulletin describing them in detail.

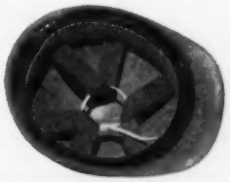
Strongest Made!

See how it's built up from 24 individual die cut pieces into a sturdy Phenolic pattern that withstands repeated 80-foot-pound drop ball tests without even fracturing!



LACE-IN SUSPENSION

Both hats and caps are available with convenient lace-in suspension feature. Easily adjusted for snug comfort to any head size.



SNAP-IN SUSPENSION

Handy Center-Tie snap-in type suspension is also obtainable in Super-Tough hats and caps. *Willson's exclusive patented "Geodetic Suspension" and Pneumatic Headband can be had in any style!*

Over 300 safety products carry this world-famous trademark

WILLSON
PRODUCTS DIVISION
RAY-O-VAC COMPANY
141 Thorn Street, Reading, Pennsylvania

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Classified Advertising

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Used Equipment
DUMP WAGONS

3—CAT. DW10 w/bottom dump wagons. 6V series. Good condition and rubber is good.

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Opportunity Advertising

—to help you get what you want—to help you sell what you no longer need.

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For Every Business Want

"THINK SEARCHLIGHT FIRST"

VENEZUELA
Compressor Dealer Available

We have been Le Roi Distributors for Venezuela since May 1945. Owing to company merger and dealers consolidation program the Le Roi line will be in new hands and we become available to handle another first class air compressor. Average sales $70,000—a year, exclusive of parts. First class banking and commercial references. Ten years experienced service.

OFICINA DE CARLOS TEJERA
CIPRESES A VELAZQUES Nº 2
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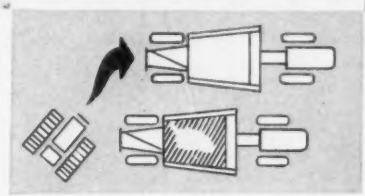
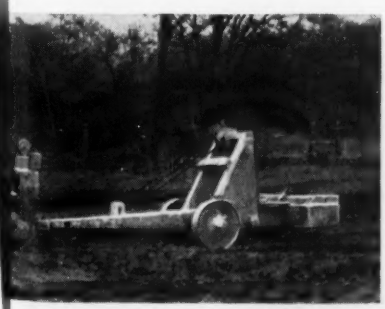
Boston 16: 350 Park Square Bldg.

By step-loading his two C Tournapulls, Frost cut down waiting time. While one "C" was loading, the other kept pace alongside. When first machine was loaded, crawler turned to push-load second scraper, with minimum lost time.



Maneuverability in tight places impresses Texas contractor

"You can work Tournapulls in tight places, and do just about anything with 'em," says Contractor D. P. Frost of Wortham, Texas — talking about his 2 C Tournapulls. Highly maneuverable "C's" have proven their ability to Mr. Frost on a number of projects. Among them was a 6-mile highway earthmoving job which Frost handled as a subcontractor for Fred Hall & Son of Valley Mills, Texas, where the Hall firm relocated a part of U.S. 183 between Austin and Brownwood in the central part of Texas.



LeTourneau-Westinghouse K-30 Rooter broke up rocky surface in loading area before scrapers went to work. Heavy cutting tooth ripped up hardest material.

Worked on and off highway

On a typical operation, Frost's "C's" cut a new grade inside the curve of the old highway, and filled in a 450′ long area on the other side of the road. Because the old road was used for hauling, scrapers often had to turn or stop to let regular highway traffic go by. "C's" ability to make full 90° power-turns . . . and its powerful multi-disc brakes . . . proved handy here. Fast turns and quick stops put Tournapulls on a par with passing traffic in maneuvering ability.

Averaged 3.12 min. on 2400′ cycle

A time study showed that Tournapulls averaged 3.12 min. on a 2400′ cycle. Each "C" picked up about 10 pay yds. of high void clay and caliche per trip. Load distance was 124′, haul was 925′, spread was 153′, and return, 1200′. Total yardage to be moved: 75,000 yds.

To break up surface rock, Frost used a LeTourneau-Westinghouse K-30 Rooter, drawn by a crawler-tractor. Heavy-duty K-30 ripped up hardest material.

Kept busy on big jobs

Frost said his machines had given good service on three previous earthmoving jobs of 130,000, 78,000 and 50,000 yds. He also liked the mobility of his "C's". They traveled from Waco, Texas, to the U.S. 183 job under their own power, covering the 120-mile distance in 7 hours.

Can Tournapulls help you?

Why not check the economy of Tournapulls for *your* earthmoving operations? Move bigger yardage, in less time, at lower cost. Ask for owner-verified facts on LeTourneau-Westinghouse equipment.

New faster-loading C Tournapull "Fullpak" scraper has 18 yds. heaped capacity, low yoke, low side sheets; speeds to 30 mph. Be sure to see the new "C"!

Fullpak, Rooter—Trademark; Tournapull—Trademark Reg. U.S. Pat. Off. CP-1044-H-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

Methods Memo . . .

An Historic Start

These paving machines of Koss Construction Co. are placing the first concrete on the first section of the interstate highway network to be built under the new 13-year highway building program. The job is an 8-mile section of U.S. 40 west of Topeka, Kans.

Although this was the first actual paving work, it was not the first contract to be let under the Highway Act of 1956. The first contract was awarded in Missouri for construction of 13 miles of U.S. 66.

In just the last few weeks, the big highway program has begun to roll. Contracts are going out at a steadily increasing rate, and construction is getting started all over the country. By the end of 1956, an estimated $400 million of contracts for construction of the 41,000-mile interstate highway system had been let.

What's Ahead

To get a non-statistical gage of the size of the highway building job, here are some comparisons worked out by Dexter M. Keezer, head of the McGraw-Hill Department of Economics.

Just the aggregates that will go into base course construction, Keezer estimates, would form 500 conical piles, each the size of the largest pyramid, Cheops. With the paving material it would be possible to bury all Manhattan under a 17-ft layer of concrete and asphalt, a project, Keezer says, that probably would appeal to quite a few people as eminently sound.

Fast Work in Florida

Official opening of the 110-mile Sunshine State Parkway between Miami and Ft. Pierce, Fla., is set for Jan. 25, just 18 months after construction began. That's pretty fast work. What's more the project will cost about $12 million less than estimated. Final cost is expected to be about $62 million. A bond issue of $74 million was sold to finance the work.

Officials of the Florida State Turnpike Authority say their policy of reducing contracts to fairly small units expedited construction and resulted in lower-than-expected costs. They say the policy stimulated competition by making it possible for many more local contractors to bid on the jobs and brought lower bids for almost all of the work.

A detailed story of the fast-paced paving program on the new superhighway is on page 90.

AGC's New Home

Ground-breaking ceremonies for the new headquarters building of Associated General Contractors of America in Washington, D.C., will take place in mid-March. The building is scheduled to be completed and ready for occupancy during the summer of 1958.

Exterior of the three-story building will be buff Indiana limestone with harmonizing trim. It will contain about 20,000 sq ft of usable office space and will be located four blocks from the White House at the corner of Twentieth and E Streets, N.W. Working drawings are being prepared by Chatelain, Gauger & Nolan, Washington architects.

Members of the Master Builders Association of the District of Columbia—the AGC chapter in Washington—will be authorized to bid on construction of the building.

On the Warpath

The Canadian St. Lawrence Seaway Authority is having Indian troubles. Six stubborn redskins are fighting tenaciously to stay on expropriated land of the Caughnawaga Indian Reserve, near Montreal And the Seaway Authority is mobilizing its forces to oust them. All the fighting is in court, of course.

Two contractors are involved. Atlas-Winston Construction Co. has a $3.3 million contract to excavate a portion of the channel and Miron Freres, Ltd., with Mannibec Construction, Ltd. holds a $5.8 million channel excavation contract. Both have notified the Seaway Authority that they will make claims against it for delay in their work because of the refusal of the Indians to move.

An Achievement

A mammoth construction job is nearing completion in India. It is Hirakud Dam across the Mahanadi River. The dam is 16 mi long—3 mi of concrete and 13 mi of flanking earth dikes—and will impound nearly 7,000,000 acre-ft of water.

A construction force of 30,000 workers with 142 Indian engineers and nearly $5 million of American construction equipment have been working around the clock for the last five years on the huge project.

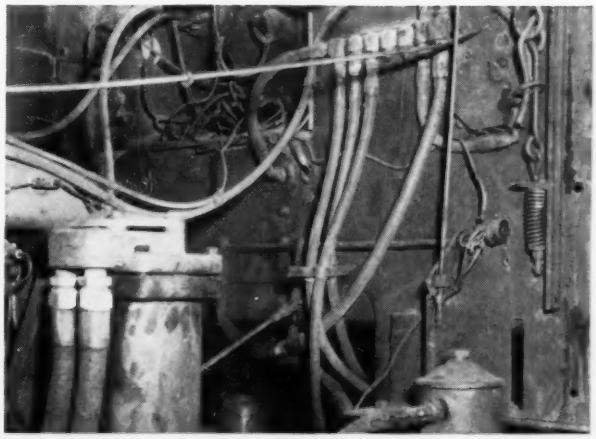
Aeroquip Hose Lines give long service under rough conditions encountered in highway construction.

"We Use Aeroquip Hose and Reusable Fittings for Fast Field Replacement . . . Long Service"

reports Job Superintendent Blease Lattimore, Suber & Co., Inc., Whitmire, S. C.

Supplying replacement hose lines for the variety of highway construction equipment used by Suber & Co. is quick and easy the Aeroquip way. Whenever a fluid line becomes worn or damaged, a field mechanic cuts Aeroquip Bulk Hose to length and attaches reusable fittings. The equipment is back on the job in minutes with a factory-quality replacement line.

Want more information? See the Aeroquip Distributor listed in your Yellow Page Phone Book, or write us.



Suber & Co. uses three types of Aeroquip Hose Lines: 1525 Hose and *SOCKETLESS* Fittings for low pressure fuel and lube oil lines; 1503 Hose for power steering and breather and return lines; 1509 Hose for high pressure hydraulic lines. *SOCKETLESS* is an Aeroquip Trademark.

Booth 206 Trail Ridge Road at the Road Show

Aeroquip

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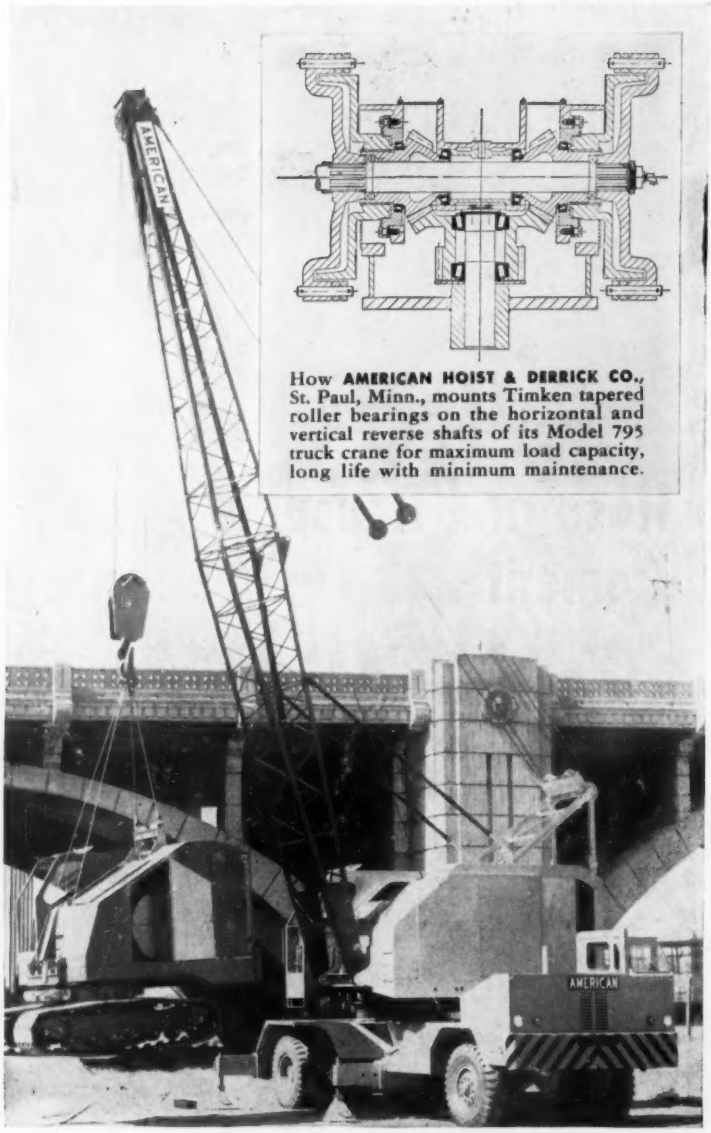
TIMKEN® bearings vital in operating truck crane at maximum capacity, lower cost



How **AMERICAN HOIST & DERRICK CO.**, St. Paul, Minn., mounts Timken tapered roller bearings on the horizontal and vertical reverse shafts of its Model 795 truck crane for maximum load capacity, long life with minimum maintenance.

THIS versatile American truck crane handles four tough jobs as crane, shovel, backhoe and dragline. The picture shows an unusual use for this 45-ton crane. Loads on the shafts and gears in the drum assembly are very heavy. And these crane units must operate steadily at maximum capacity with simple, easy maintenance. That's why American Hoist & Derrick Co. uses Timken® tapered roller bearings in vital positions—drum shaft, horizontal slewing shaft reverse gears, vertical slewing shaft, retract shaft gear hub, retract shaft intermediate gear, and independent travel vertical drive shaft.

Because of their tapered construction, Timken bearings take *both* radial and thrust loads in any combination. And full line contact between rollers and races provides extra load-carrying capacity. Shafts are held in rigid alignment. Gear mesh is smooth and accurate—wear is reduced to a minimum.

To take the shock loads often encountered, rollers and races of Timken bearings are case-carburized to get hard, wear-resistant surfaces over tough, shock-resistant cores. And true rolling motion makes Timken bearings practically friction-free. As a result Timken bearings provide long bearing life with minimum maintenance wherever wheels and shafts turn.

To assure finest bearing quality, we make our own fine alloy bearing steel—America's only bearing manufacturer that does. To be sure you get the *most* for your money, specify Timken bearings when you design, build or buy machines. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

SEE YOU AT THE

American Road Builders' Association Road Show

Space 816 Donovan Hall, Second Floor

International Amphitheatre, Chicago

JANUARY 28 TO FEBRUARY 2, 1957

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